

AUGUST 1, 1947

Engineering Library

AUTOMOTIVE INDUSTRIES

The Industrial News Authority Devoted to Automotive Products for Land, Air & Water

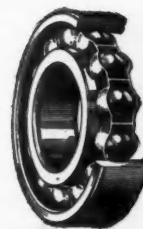


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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

August 1, 1947

Vol. 97, No. 3

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 Cable AddressAutoland, Philadelphia

Member: Audit Bureau of Circulations; Associated Business Papers, Inc.
 AUTOMOTIVE INDUSTRIES is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned and Published by
CHILTON COMPANY (INC.)

Executive Offices
 Chestnut and 56th Streets, Philadelphia 39, Pa., U. S. A.

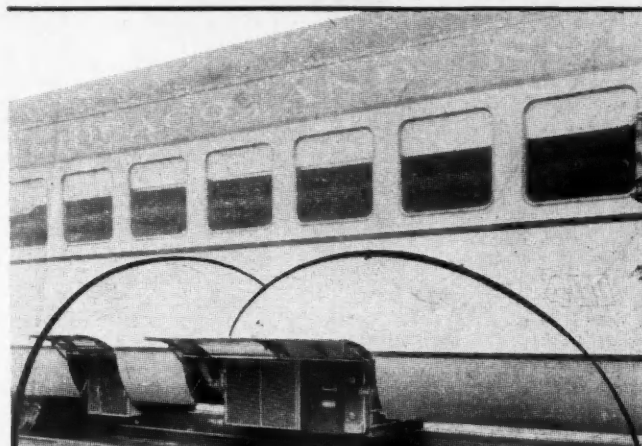
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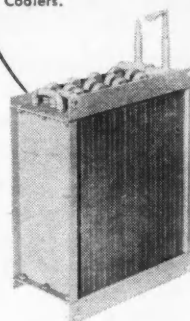
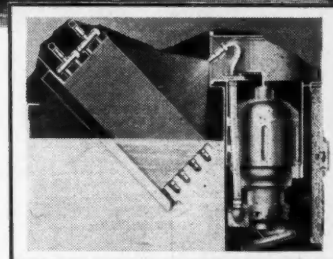
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The newly engineered Chi-
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A Young Evaporator Coil (left) is the
 heart of the Waukesha Sub-Cooler,
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To insure passenger comfort and ample refrigeration in the hottest weather, the Waukesha Evaporative Sub-Coolers are used to supplement the capacity of ice engines. These coolers are equipped with Young Evaporator Coils to provide dependable, low-cost cooling. Six different types of Young Coils are available for various heating and cooling jobs. All are of high relative efficiency, planned and engineered to give maximum heat transfer in a minimum of space. Your company, like the Waukesha Motor Company, will find Young Engineering Service will result in practical, money-saving solutions to your heat transfer—heating or cooling—problems.

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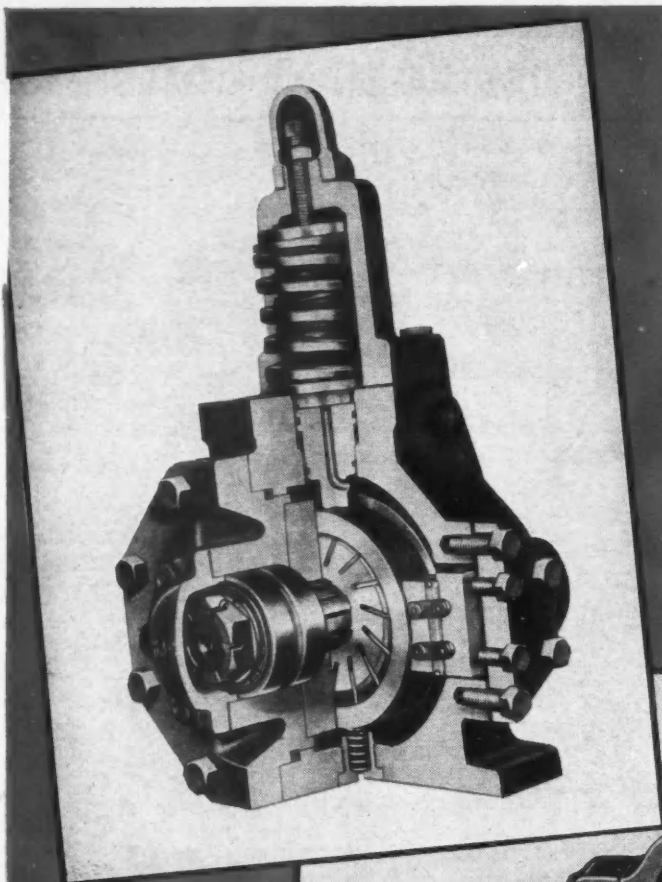
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August 1, 1947

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AUTOMOTIVE INDUSTRIES, Vol. 97, No. 3. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, \$2.00 per year. Canadian and Foreign \$5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 15th), 50 cents.



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Some High Spots of this Issue

Cutting Production Costs on Bumpers and Springs

How the United States Spring & Bumper Co. in modernizing its plant by the extensive installation of material handling equipment, with special emphasis on mechanical conveyors and power-driven lift trucks, has reduced costs and increased output. Five men now handling some 8000 pounds of steel per hour through forming, quenching and tempering operations in spring making, and 180 bumpers polished per hour are among many benefits derived. See page 24.

Quality Control at Cadillac

With physical and chemical laboratories included in the facilities of the inspection department, complete control of raw material, processed material and manufactured parts is maintained. Practical standards of quality are set up through cooperation with both engineering and production, a system calculated to assure quality in advance of manufacture. See page 27.

New Machine Tools on Parade

Here we have a preview of the Machine Tool Show of the National Machine Tool Builders Association to be held Sept. 17-26 in the Dodge-Chicago plant where some 2000 machine tools, including the latest developments in production equipment, will be shown by approximately 275 exhibitors. It begins on page 28.

Novel Method of Determining Incipient Engine Knock

A unique German war development by means of which there can be an accurate determination of just when an engine begins to knock. It is based on pressure acceleration and uses a piezoelectric pickup, amplifier and oscillograph to give a complete curve of pressure acceleration against charging pressure. Starting on page 30.

High Speed Italian Cars

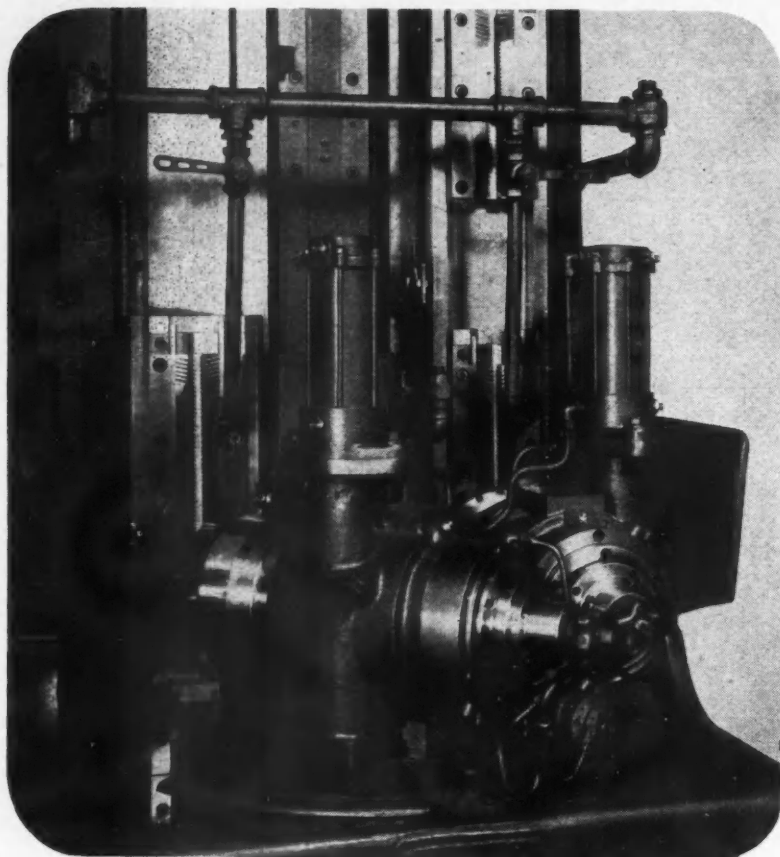
W. F. Bradley, Special European Correspondent for AUTOMOTIVE INDUSTRIES, tells us about some of the latest products of the Italian automobile designers and builders. He gives interesting details of the lightweight, 105 mph, 50 hp Cisitalia, the Maserati and the Moretti cabriolet. See page 36.

26 New Production Equipment and New Product Items And Other High Spots Such As:

An engineering analysis of epicyclic gear systems for torque converters, a comprehensive two part article of which Part I is herein presented; a Diesel ignition system of new design; a new way to compute effective valve area; special lacquer-drying ovens at Briggs; and an interesting and informative article on the actual strength and effectiveness of this country's air forces today.

Comprehensive Interpretation of Industry News, Page 17

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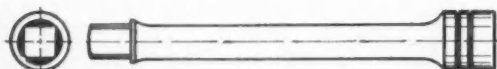
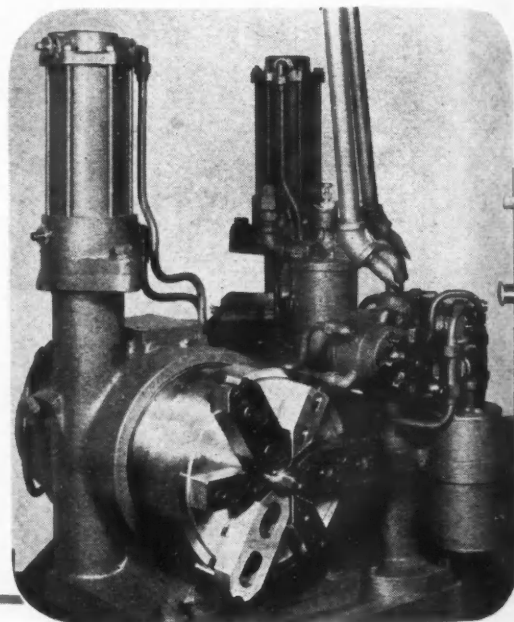
CINCINNATI

Split-stroke broaching

applied to a family
of 17 parts produces
578 square ends per hour

CINCINNATI No. 3-48 Duplex Vertical Hydro-Broach, showing automatic pneumatic chuck equipment and tooling for broaching the square ends of socket wrench sets. Engineering specifications on the 3-, 5- and 10-ton sizes may be obtained by writing for catalog M-1387-1.

● New production ideas and techniques are always worth investigating, for they might offer attractive cost-reduction possibilities which you could use in your own shop. In the field of surface broaching, the **SPLIT-STROKE** method is one of these new ideas. Developed by Cincinnati Engineers, it has a wide range of potential applications. ¶ Fundamentally, the **SPLIT-STROKE** method provides a noncutting gap in the broaching inserts, a brief time interval during which the work can be indexed or shifted, presenting new surfaces to the remaining cutting teeth. ¶ The example shown here is a CINCINNATI No. 3-48 Duplex Vertical Hydro-Broach, completely equipped by Cincinnati Application Engineers to broach three sizes of square ends... $\frac{1}{4}$ " , $\frac{3}{8}$ " and $\frac{1}{2}$ " ... on a family of seventeen parts. The operator loads and unloads the fixtures and the remainder of the cycle is completely automatic. ¶ The **SPLIT-STROKE** method of surface broaching is one of the many developed by Cincinnati Application Engineers to reduce the cost of machining operations. Perhaps this method could be applied to some of the parts in your shop. Our engineers will be glad to discuss it with you. Send blueprints and details.



One of the parts which was broached to a $\frac{1}{2}$ " square on the end. During an actual test run, production was 578 per hour.

Head-on view of the chuck. The three elements between the chuck jaws serve as approximate locators of the work.

See the
CINCINNATI MILLING DISPLAY
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AUTOMOTIVE INDUSTRIES

NEWS of the INDUSTRY

Despite Industry Efforts, Car Prices May Increase

Talk of a price increase for automobiles is in the air again in Detroit. The costly coal wage settlement is expected to lead to an increase in basic steel prices which eventually will mean increased cost all along the line. Also, some prices of some supplies have been inching upward in recent months. It is felt that at least some of the smaller manufacturers will not continue to absorb the increases, but will boost the prices of their product. Ford and Chevrolet truck prices have increased. Ford stated that rising manufacturing and material costs necessitated price increases of as much as \$98 in some models although others were reduced as much as \$17. The difference in price now separating V-8 and six-cylinder truck models has been reduced from \$58 to \$30. Henry Ford II said recently, however, that his company does not contemplate any price increase soon for passenger cars. He said that increases in the cost of coal and steel would boost manufacturing costs at least \$10 a car, but that the company would absorb the increase. He added, however, that there was no way yet to tell how much prices of items purchased from suppliers might increase.

One automobile company executive points out that the only reason car prices have not been raised is that the industry is attempting to hold prices down. He said that new car prices at the dealer level are several hundred dollars under the actual going prices dictated by supply and demand as reflected in sales on used car lots. He added that while it was possible to absorb the increase in wage rates granted this year, other costs, including those of suppliers, are still rising and that an increase in automobile prices would not be surprising. It is possible that some companies may wait to increase their prices until they introduce new models, on the basis of engineering and styling improvements.

Willys 3rd Qtr. Earnings Best Peacetime Qtr. Since '28

Willys-Overland Motors, Inc., has reported the largest quarterly return for any peacetime year since 1928. For the third quarter of its fiscal year ending June 30, the company reported a consolidated net profit of \$1,165,103 after allowance for taxes. Third quarter earnings were greater than those for the previous six months. Profits for the first three quarters of the current fiscal year were \$332,315; \$832,570; and \$1,165,-

103 respectively, for a combined total of \$2,329,988. James D. Mooney, chairman of the board and president, said the increased earnings were a direct reflection of a greater volume of production.

Sheet Steel Shortage Cuts July Automotive Production

With General Motors Corp.'s plants closed the third week in July, production of cars and trucks for that month is expected to slip to no more than 390,000, which is about 50,000 under the earlier forecast for the month. The GM layoff cut output by about 30,000 units. With Nash and Chrysler also down during the month, July was a very poor period for automobile production. In all cases, lack of sheet steel was the cause for the production breakdown. There is very little optimism in the automobile industry over any increase in production until late this year.

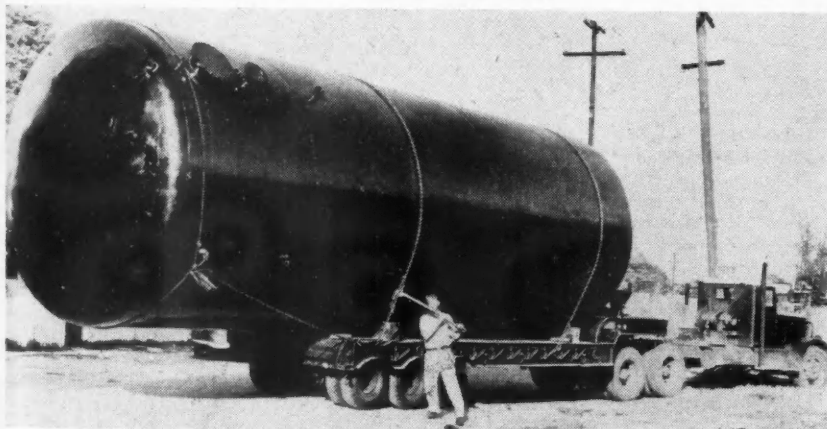
Improved Materials Supply Seen by Auto-Lite President

While most automobile companies are greatly concerned over the shortage of sheet steel, to the extent that several have been forced to close for short periods, Royce C. Martin, president of Electric Auto-Lite Co., says that raw materials used in the manufacture of automotive replacement parts are becoming available in greater supply. He said that some suppliers of copper, zinc, steel, and lead are asking the company to determine its needs, and are offering a full supply delivered practically on time. The improvement is in marked contrast to conditions prevailing a year ago when express shipments were used at various times to keep parts plants operating.

Survey Shows Heavy Demand For New and Used Vehicles

A University of Michigan research center study indicates that the demand for both new and used cars will exceed the supply through 1947. The survey was made under a contract with the Federal Reserve System. The study revealed that during

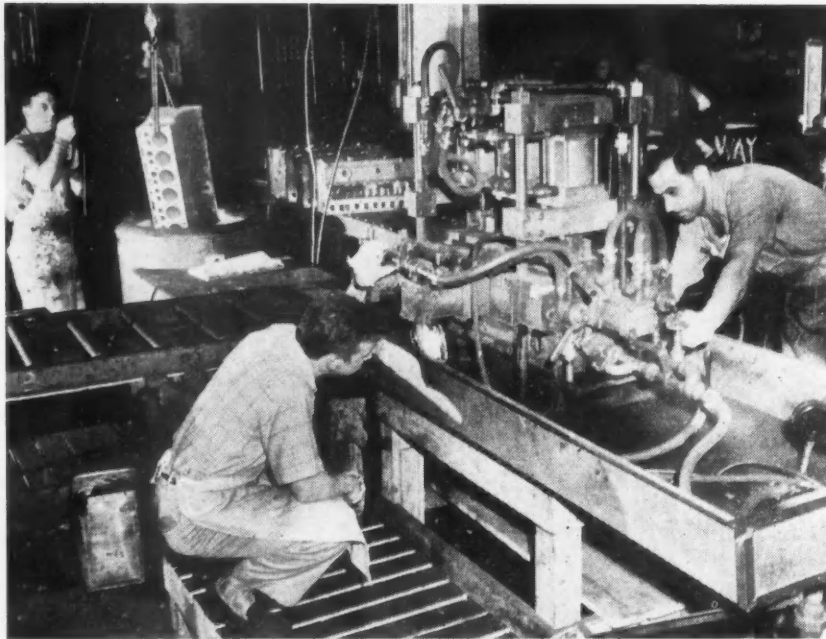
Moving a Big One



A giant fuel storage tank—35 ft in length, 12 ft in diameter and weighing 12 tons—is shown loaded by the General Trucking Co. of Los Angeles on a three axle Fruehauf Carryall, produced by the Fruehauf Trailer Co. of Detroit.

NEWS of the INDUSTRY

Hot and Cold Test



Engine blocks are shown being tested at Kaiser-Frazer's Detroit Engine Div. At left a block is lowered into a cooling unit which subjects it to temperatures as low as -100°F . A special fixture is shown at the right shooting water at 160°F through the water jacket.

the course of the year four million persons would be willing to buy new cars and that 1.5 million were in the market for used cars. Other data indicate that four per cent of the persons earning less than \$1000 a year expect to buy some type of automobile; six per cent of those earning \$1000 to \$2000 would buy; 12 per cent of the \$2000 to \$3000 group; 18 per cent of the \$3000 to \$4000 group; and 24 per cent of those earning \$5000 or more are in the market. Of the new car buyers, 59 per cent expect to pay all cash, whereas 45 per cent of used car buyers intend to do so.

Ward Estimates Output Rise For Week Ending July 18

Car and truck production for the week ending July 18 was estimated at 102,630 units by Ward's Automotive Reports. This compares with a revised estimate of 90,075 for the preceding week, and 80,985 for the same week a year ago.

K-F Develops Test For Engine Blocks

Kaiser-Frazer Corp. has set up on an experimental basis a "thermo-shock" treatment to test engine

blocks for flaws. Before the engine block goes to assembly and before it is completely machined, it is placed in a low temperature unit at a temperature of -100°F . When the block is thoroughly chilled, it is placed in a special fixture, and hot water is run through the water jacket. K-F engineers say the shock test will reveal flaws in the castings,

so that defective blocks can be scrapped before they reach the assembly line. Under the present setup a complete test requires four hr but when and if the experiment proves practicable, equipment will be put into the production line which will enable testing of all blocks in a period of four min each.

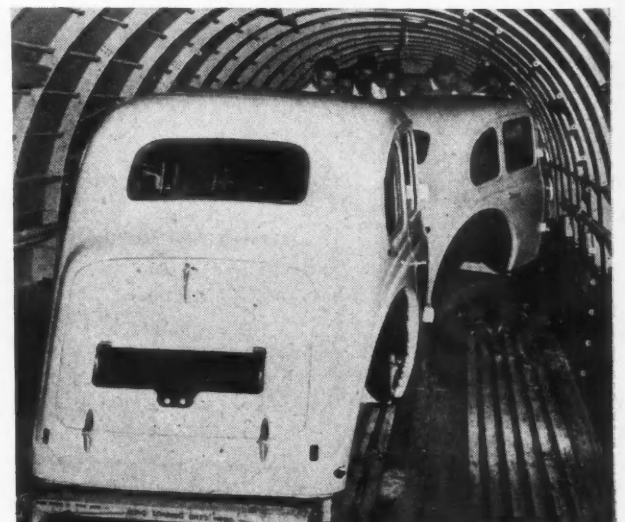
New Convertible Engine By International H.C.

International Harvester Co. has announced the development of a new engine which is convertible in production as either a gasoline or Diesel engine. The announcement was made by H. T. Reishus, general manager of the company's Industrial Power Div. The new engine is comparable in size with the "4" series gasoline engine now used in International's two-plow farm tractors and in the I-4 wheel tractors.

The major feature of this new engine from a production standpoint is that it will enable the company to produce both gasoline and Diesel tractor and industrial engines on the same assembly line, thereby increasing production and reducing operating costs. Since the basic structure for both engines is relatively the same, an assembly line adaptable for both engines can be built.

"The ultimate objective," said Mr. Reishus, "is to be able to produce a lighter and lower-priced engine to meet a growing demand for Diesel power farm tractors and industrial power units." It is estimated that it will be 18 to 24 months before domestic production of the new en-

Bodies By Air



Automobile bodies shipped by air from Melbourne to Sydney, marked a new "first" in Australian commercial airline history. The bodies are shown before unloading at Sydney. Acme photo.

NEWS of the INDUSTRY

gine is started. Since most of the foreign demand has been for the Diesel engine type tractor, designs for the new engine have been turned over to the company's foreign operations division for the subsidiary plants in Doncaster, England, and Geelong, Australia.

Wage Boosts Add \$150 Million To Yearly Automobile Payroll

AMA reports that wage increases granted in the automotive industries which covered about 90 per cent of the employees of motor vehicle manufacturers have increased payrolls by \$150 million annually for production workers. Costs of pension plans, increased vacation and call-in pay or other benefits for hourly rated employees are not included in the estimate, nor are increases to more than 100,000 salaried employees. About 75 per cent of the production workers received an increase of 11½¢ an hour and six paid holidays, equivalent to 3½¢ an hour.

Dearborn Motors Not a Ford Subsidiary

Frank R. Pierce, president of Dearborn Motors Corp., revealed at a press conference recently that the company definitely is not a subsidiary of Ford Motor Co., but that it is an independently organized concern set up to distribute the new Ford tractor and Dearborn farm implements. He stated that neither the Ford Motor Co. nor any member of the Ford family except E. Kanzler, has any financial interest in Dearborn Motors. Although he declined to give details of stock distribution, he revealed that all board members, with the exception of Grant Cook of the law firm of Smith, Cook, Jacobs & Beake, are stockholders. Other directors are: Mr. Pierce, Thomas A. Farrell, vice president; Ernest Kanzler, chairman of Universal Credit Corp.; Ernest R. Breech, executive vice president of Ford Motor Co.; and Ford vice presidents J. R. Davis and Albert J. Browning. It has been reported in Detroit that Ford has been able to attract some of its top executives from other companies by offering stock participation in the distributing company.

Expect Congressional Action On Excise Taxes in January

Although Congress did not act on Federal excise taxes on motor vehicles and trailers, gasoline and lubri-

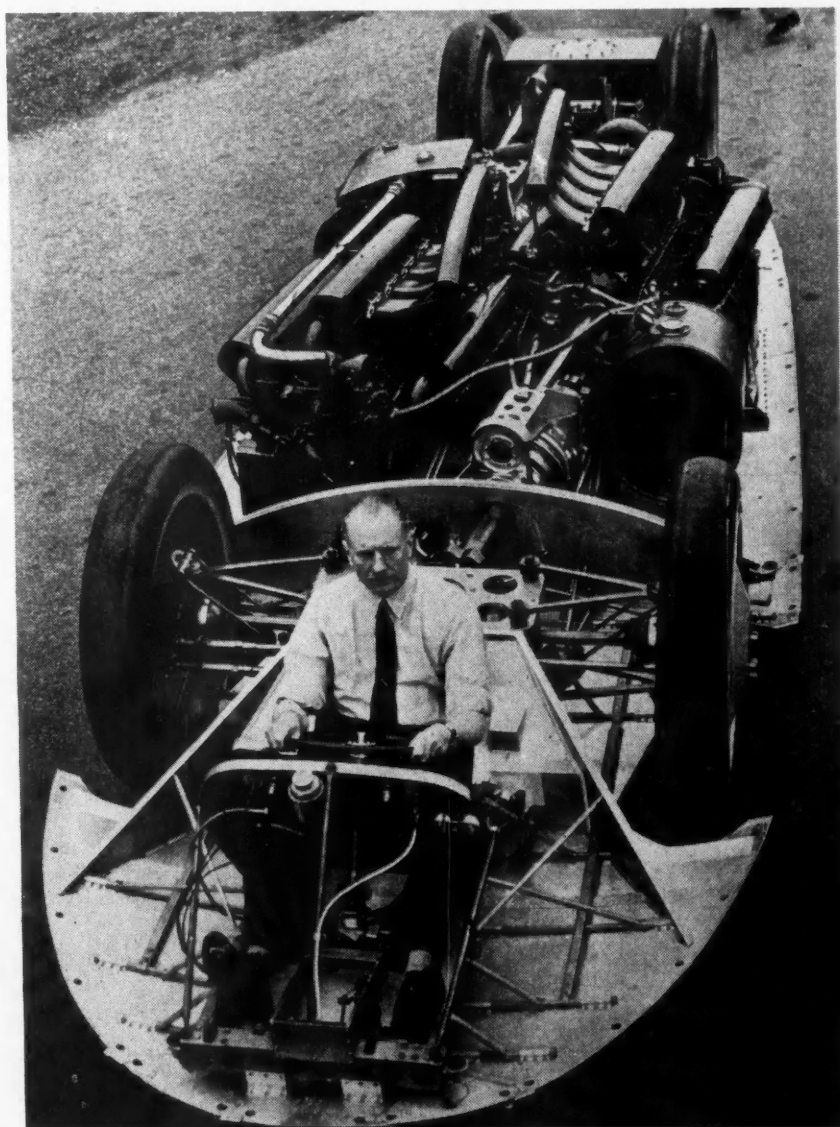
cating oil, tires and tubes, and automotive parts and accessories, there have been some indications as to what action will be taken in regard to excises in the general tax bill which will be introduced when Congress reconvenes next January. While there has been some talk of increasing excise rates there is a strong feeling that the bill will probably cut most existing excise taxes back to pre-war rates, which would mean a 50 per cent cut generally. Certain emergency excises might be eliminated entirely, but it is not likely that the major automotive levies will be dropped. In addition, it is ex-

pected that the excise tax structure will be broadened to include more items. This sort of provision has received strong backing in business circles as well as in Congress since it is felt that such taxes do not cut purchasing power as greatly as the present high personal income tax rates.

Step Up In Ford's Buying On West Coast

Acceleration of Ford Motor Co.'s West Coast purchasing program is seen in the placing of 24 new contracts for automotive parts with 11

Mr. Cobb and His Car



John Cobb is shown seated in the cockpit of his Railton-Mobil Special in which he hopes to break the world's land speed record of 369.7 mph on the Bonneville Flats, Utah. Two 1250-hp supercharged 12-cyl Napier engines power the car. British Combine photo.

NEWS of the INDUSTRY

Star That Shoots



The AAF's new Lockheed P-80B "Shooting Star", jet propelled fighter now being produced by Lockheed Aircraft Corp. is believed to have more firepower than any jet fighter in the world. Water injection in the Allison-built super turbo-jet engine has increased take-off and climb performance. Army Air Forces photo from Acme.

manufacturers in the single 10-day period, June 20-July 1. Previously estimating that two years would be required before California manufacturers would be mass producing and that Ford would be buying \$50 million worth of automotive parts annually, L. C. Disser, Ford's purchasing representative on the West Coast, said that he was confident that this would now be sharply revised downward.

Two Jets, Two Reciprocating Engines in Tandem on XP4M-1

A new mid-wing patrol bomber, the XP4M-1, now being tested by Glenn L. Martin Co. for the Navy is powered in an unusual fashion by two jet engines mounted behind two reciprocating engines. Two Pratt & Whitney 3000 hp engines with a normal cruising speed of over 200 mph are reported to be set tandem with two Allison J-33-4 jet engines, producing 4000 lb static thrust. The jets boost the speed of the plane by 100 mph, so that a speed of over 350 mph is available. The plane is reported to have a wing span of 114 ft, an overall length of 82½ ft, and to carry over 78,000 lb into the air with a maximum range of over 3000 mi at average cruising speed.

Pontiac Expands Foundry Capacity

Foundry capacity at General Motors Corp.'s Pontiac Motor Div. is increasing steadily. Recently two new 108-in. cupolas were commissioned, permitting other units to be torn down and enlarged. This will ultimately increase melting capacity 50 per cent—about 1200 tons a day. Down-time periods are reduced with the new cupolas which can use about

twice the normal thickness of ceramic lining. Exhaust gases are cooled, and ash discharge virtually eliminated by an overhead baffling and water spray system. New sand is screened and dried, and molding and core sand is stored, reclaimed and reused by newly installed large sand reclamation system.

Tjaarda Plans a Light Car

Plans for a new light car were recently revealed by John T. Tjaarda, Detroit, industrial design engineer and former chief of design for Briggs Mfg. Co. The new automobile, a lightweight low-priced six cylinder model, is expected to be produced in the first quarter of 1948 by North Amer-

ican Motors, Inc. in a defense plant in Grand Prairie, Tex., which is to be acquired. Reportedly to sell for \$1095, the new car is said to have a 100-in. wheelbase and is powered by a Continental engine incorporating certain special ignition and manifold developments giving what is described as "controlled combustion" and for which exceptional fuel economy is claimed. A new light weight material, Mr. Tjaarda announces, will be used for the frame, and he also says that the body will be of steel to the extent of about 75 per cent with the balance plastics.

Assembly plants are expected to be established in Dallas, Baltimore and on the West Coast with engineering and purchasing offices in Detroit, executive offices in New York City and plant offices in Grand Prairie.

Jet-Propelled Parasite Fighter

A possible answer to the problem of supplying fighter protection for far ranging bombers may be the XP-85, a jet propelled parasite fighter, now being produced by the McDonnell Aircraft Corp. Classified as secret by the Army Air Forces at present, the tiny plane is expected to be test flown in September. The XP-85 is reported to have a wing span of about 20 ft, a length of approximately 15 ft, and a gross weight between 3000 and 4000 lb. A West-

Heavy Helicopter



Flight tested recently, the Army Air Forces' XR-10 is produced by the Kellett Aircraft Corp. of North Wales, Pa. Powered by two Continental 525 hp engines, the XR-10 with a gross weight of almost 11,000 lb, a top speed of about 121 mph at sea level and a range of 350 mi is reportedly the world's most powerful helicopter. International News photo

NEWS of the INDUSTRY

inghouse turbo-jet, probably 19 in. in diam, with a 1500 lb thrust powers the plane. Folding wings enable the fighter to be hauled into the bomber's belly. It can be launched in mid-air, and may be taken aboard by catching a large hook which swings below the bomber.

Studebaker Promotes Johnson To Assistant to President

Courtney Johnson has been promoted to assistant to the president of Studebaker Corp. Mr. Johnson will continue as assistant to Studebaker's chairman of the board.

Allis-Chalmers Buys Plant In Gadsden, Ala., from WAA

September 1st has been set as the tentative date for Allis-Chalmers Mfg. Co. to take over the Gadsden Ordnance Works, Gadsden, Ala., leased to Allis-Chalmers in May by the War Assets Administration. According to Boyd Oberlink, assistant to the vice president, the firm hopes to build cotton pickers and possibly tractors at the plant, ultimately employing about 2500 people in three years.

Allis-Chalmers will pay a total of \$575,000 for their three-year lease, and is expected to exercise its option to purchase the entire 337 acres and all buildings of the installation within this three-year period. The properties include several warehouses, machine shops and air-conditioned storage buildings. Most of the buildings and almost all of the machinery

can be adapted to the manufacture of farm machinery. WAA had appraised the installation at \$1,800,000.

Simca-Cinq Is Best In French Fuel Trials

Greatest distance covered in the annual French fuel economy competition, known as the "5-litre Can" was 60.15 mpg (U. S.) by a Simca-Cinq (French Fiat) of 34.7 cu in. piston displacement. The car weighed 1455 lb with fuel and carrying two persons. These trials are for all types of vehicles and are run on a closed circuit embodying average road conditions. A minimum speed of 31 mph had to be maintained by the smaller cars, this was increased to 37.2 mph for the larger models. The amount of gasoline supplied to

each car was 1.319 gal, the weight of this at 15 C is 8.077 lb. Temperature during most of the trials was 14 C, humidity 75 per cent, and wind less than 11 mph.

Tests showed that practically no attempts had been made to increase the compression ratio. Pressure in the cylinders, as shown by the compression gage, engine running throttled down, showed 76.8 psi for the stock Citroen; 59.7 for the four cylinder Renault; 76.8 for the Delahaye; and 88.1 for the Simca-Cinq running with a delivery body. All engines ran with a very lean mixture and cold spark plugs. Gasoline economizers were fitted on the Simca truck, the Simca-Huit, and the Citroen. These devices collected and revaporized liquid gasoline. The Simca-Cinq which covered the greatest distance used a Solex carburetor.

The following table gives the result of the trials:

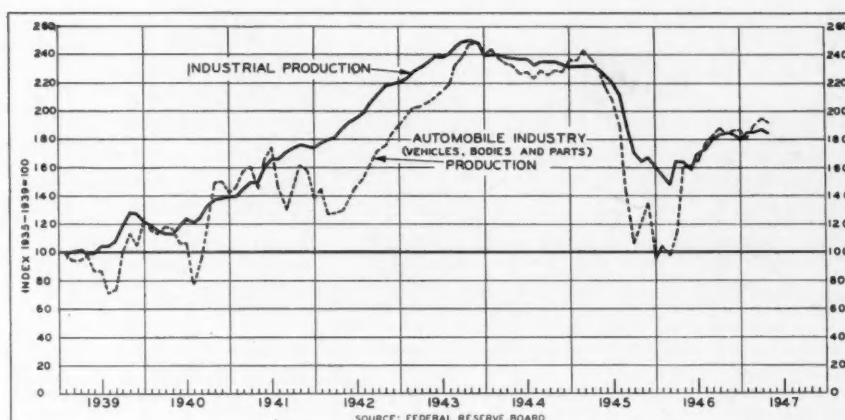
Car	Passengers	Car-Weight tried* Lb	Distance Covered In Miles	MPG (U.S.)
Simca-Cinq	2	1455	79.34	60.15
Simca-Cinq	2	1521	75.40	57.16
Simca-Huit	2	2294	50.07	37.98
Fiat-Huit	6	3460	50.36	38.18
Renault	6	3416	29.63	22.46
Citroen 11 hp	5	3273	32.24	24.41
Delahaye 18 hp	5	4122	32.55	24.67
Delahaye 20 hp	5	4056	33.97	25.75
Delahaye 20 hp	5	4309	26.10	19.78
Simca truck	1	1631	57.70	43.74

*Passengers carried include driver.

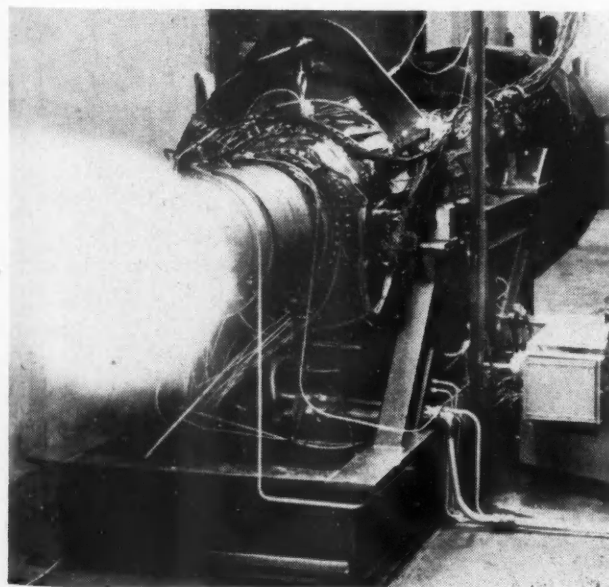
Chrysler Service Program To Train Dealer Mechanics

Chrysler Corp. has announced a national service training plan covering more than 50,000 mechanics in Plymouth, Dodge, DeSoto, and Chrysler dealerships. The mechanics will qualify for a certificate after completion of 12 consecutive subjects, including a series of tests. An additional certificate is given after

Automobile vs Industrial Production



XJ-37 Roars



On the test stand, this new turbo-jet engine, the XJ-37, developed by Menasco Mfg. Co. and Lockheed Aircraft Corp. for the AAF, is reported to have a rated thrust power up to 5000 lb; it can be used as either a jet or as a gas turbine with a propeller.

NEWS of the INDUSTRY

Latest Corsair



The F4U-5 is the latest version of the famous Corsair fighter-bomber. Now in production at the Chance Vought Aircraft Div., United Aircraft Corp., the new plane is powered by the new Pratt & Whitney R-2800-E Double Wasp engine. With a top speed of over 450 mph, the F4U-5 is said to be the fastest propeller-driven, single-engine fighter in the world.

completion of 24 consecutive subjects, after which the mechanic will qualify for recognition as a "master technician" when other requirements are fulfilled.

William A. Barber

William A. Barber, 63, Treasurer of the Chilton Co. (Inc.), died suddenly on July 20, 1947, at his home in Bala-Cynwyd, Pa. Mr. Barber was born in Onarga, Ill., and was a graduate of New York University where he later became Professor of Economics. Before joining Chilton in 1932, he was an executive of Lee, Higginson & Co., a New York and Boston brokerage firm.

Polk Reports 210,794

New Car Registrations in May

Based on tabulations from 40 states, new passenger car registrations totaled 210,794 units for May, R. L. Polk & Co. reported recently. If present ratios are held, about 295,000 new car registrations are expected when all states are tabulated.

Research Committee For Refrigerated Motor Transport

Formation of a Research Committee on Refrigerated Motor Transport has been agreed to as a result of a meeting between officials of the Dept. of Agriculture, American Trucking Association, and the Truck-Trailer Manufacturers Association. The initial objective of the committee will be to collect information on the present motor transport equipment available in order to determine the refrigerating efficiency and relative performance under normal conditions of such equipment.

Record Gasoline Consumption By Motor Vehicles in 1946

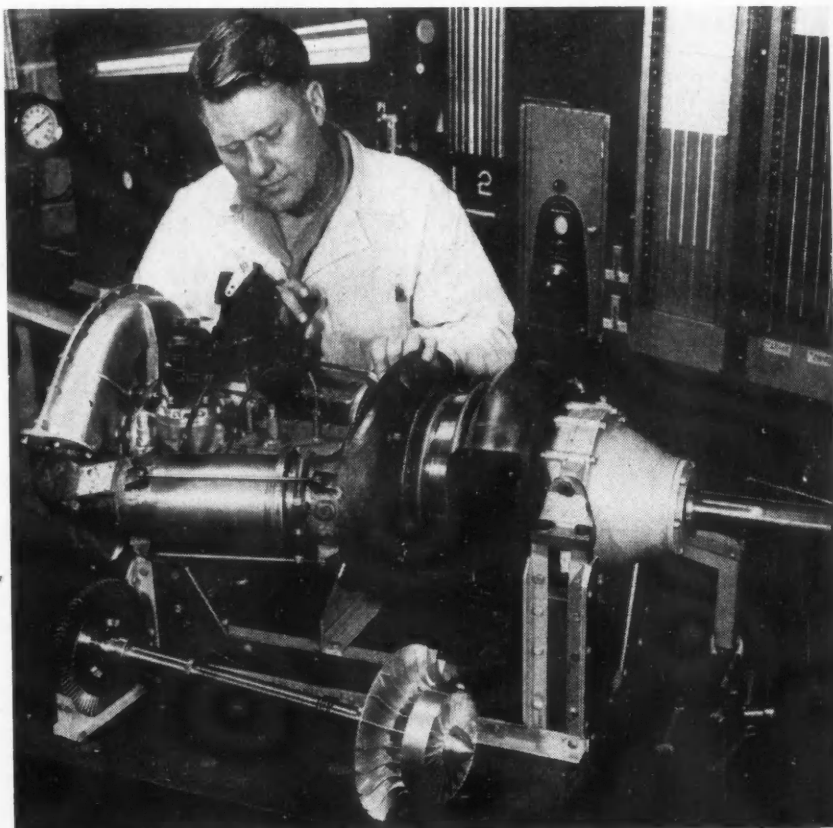
Motor vehicle consumption of gasoline in the United States in 1946 amounted to 25,649 million gal, as

compared with a total of 24,192 million gal consumed in 1941, the previous peak year, according to the U. S. Public Roads Administration. Total mileage estimated for all types of motor vehicles last year amounted to 340,655 million miles, with rural travel accounting for 170,606 million miles, and urban travel for 170,049 million miles. Passenger vehicles, including taxis and buses, traveled 284,509 million miles; trucks, 56,146 million miles. Average motor fuel consumption per vehicle was 747 gal. The average passenger car owner traveled 9942 miles during the year, purchased 665 gal of gasoline, and obtained nearly 15 mpg.

Settlement Not Expected To Raise Parts Prices Soon

Frank Rising, general manager of Automotive and Aviation Parts Manufacturers, Inc., believes that expected increases in the cost of steel will not be reflected in higher parts

Baby Turbo-Prop



Weighing 140 lb, this new Boeing Model 502 turbo-prop gas turbine delivers 200 hp to the shaft. A power dividend is obtained from 50 lb thrust produced by exhaust. Of the two-burner type, it is 42 in. in length by 22 in. in maximum diam, and is suitable for aircraft, boat or other power use. The recently developed Boeing Model 500 turbo-jet produces 150 lb of thrust, weighs 85 lb, is 29 in. in length by 22 in. in maximum diam.

NEWS of the INDUSTRY

prices for about six months. He said that higher freight rates currently being sought by railroads might be a factor influencing prices. Since most companies in the parts industry have effected wage settlements in the 11 to 15 cent range, it is not expected that the large gains made by the coal miners will affect the parts industry wage structure until about a year from now when contracts can be reopened for negotiation.

T. C. Delaval-Crow

Thomas Clive Delaval-Crow, 61, for 26 years Chief Engineer of the New Departure Div., General Motors Corp., at Bristol, Conn., died recently at his home after a prolonged illness.

Engineering Progressing On Ford Six Cylinder Engine

Ford Motor Co. is said to be well along with design and engineering changes on its six-cylinder engine. The improved engine is said to develop about 100 hp, and reports persist that the company will push the six in the 1948 Ford line, with the V-8 optional. An improved V-8 is also said to be in the works for the Mercury, with a larger V-8 slated for the Lincoln line.

New Chevrolet Parts Plant To Be Built in Parma, Ohio

Chevrolet Div. of General Motors Corp. is going to construct a new parts plant in Parma, O. Manufacturing Chevrolet automobile parts, the new plant will occupy 1,325,000 sq ft.

Labor

Inform Ford Foremen Of Plans and Policies

In line with its new program to promote harmony in its management relations, Ford Motor Co. has started mailing to its foremen at their homes monthly communications as a regular information service. The news letters will be mailed to all Ford supervisors to acquaint them with company decisions, plans, and policies. The first letter advised foremen that they were to take their vacations within 60 days in order to permit the company to have a full force on hand when it swings into its new model program. The second letter explained that, although salaried personnel would not be re-

The Easy Way to Lay Pipeline



Flying at a height of 15 ft, this helicopter laid 400 ft of rubber pipeline in 25 sec. at Army Engineer Center, Ft. Belvoir, Va. Folded into a special container and released at the press of a button by the pilot, the hose was developed by the U. S. Rubber Co.

quired to ring time clocks after July 21, payment for overtime would in no way be affected. Following the return of Ford foremen after their unsuccessful 47 day strike at Detroit plants, Ford discharged 32 of them on charges of "violence and terrorism" during the strike, after hearings before a board of company officials.

Added Wage Increase Hinges On Continental Production

Continental Motors Corp. has reached agreement on a new contract with the UAW-CIO, calling for a wage increase of 8.5c an hour, retroactive to May 5, plus six paid holidays. The agreement stipulates further that an additional three cents an hour may be paid Sept. 1 if merited by satisfactory production. The raise would be retroactive to July 14.

Ford Motor Co. of Canada Agrees to Pension Plan

Ford Motor Co. of Canada has followed the lead of the Ford Motor Co. in the U. S. and has tentatively agreed to a pension plan for its 9000 employees. Details have not been announced but it is believed they will parallel those of the agreement that is currently being worked out by Ford and the UAW-CIO for the company's U. S. employees. In addition

to the pension plan, the agreement calls for a three cent hourly wage increase plus four paid holidays. The pension plan is retroactive to July 1 and the pay increase to July 14.

Metals

Copper

It is expected by producers that the current firm copper market price of 21.50¢ will continue for the next few months. A 1/4¢ premium is reportedly being paid by some wire mills for delivery of nearby copper. The shortage at refineries of wire bar facilities is resulting in some difficulty in supplying wire mill needs. Wire mills, the trade feels, are trying to produce as much as possible of their order backlog before order books might be affected by any fluctuations in business conditions.

Lead

Nearly all consumers are currently satisfied with lead supplies with full requirements being obtained from major producers. A dip in summer production, however, is expected as labor chooses work in the field during the summer. Production in the early part of the year has been stepped up to record tonnages under the
(Turn to page 67, please)

Fig. 1—Conveyor-type high-heat furnace for heating spring leaves.



Lowering Production Costs of Bumpers

IN MODERNIZING its plant for peacetime production of automotive equipment, the United States Spring & Bumper Co. has installed material handling equipment for transporting most of the parts through the plant by mechanical conveyors or by power driven lift trucks. This article describes some of the features of the installation.

All steel is ordered from the mill rolled to shape



and cut to specified multiple lengths in 2.5 to 5.0 ton bundles. These bundles are unloaded from freight cars and piled in storage yards to be processed as required. As the original storage space was inadequate, to provide additional capacity a crossover crane system was recently installed to transfer bundles of steel from the new yard to the old yard. With this addition we can now transfer a 5-ton bundle of steel from any one of the three yards by overhead cranes.

Spring leaves are forged as individual parts and then accumulated at the feed end of conveyor-type high-heat furnaces to be heated for forming and quenching. This conveyor, shown in Fig. 1, is made of heat resisting castings with a series of V's across the hearth. The spring leaves are placed on edge in these V's and conveyed through the furnace at 1500F to the cambering machines for forming and quenching. Following this, the leaves are quenched in oil and placed on edge on a 50-ft slat-type conveyor for tempering. It requires 45 min for a spring to travel the full length of these tempering furnaces. The flat slat-type conveyor is ideal for grouping the leaves into individual springs. Five men can handle approximately 8000 lb of steel per hour through the forming, quenching and tempering operations.

Fig. 2—Slat bench-type conveyor in the leaf spring assembly department.

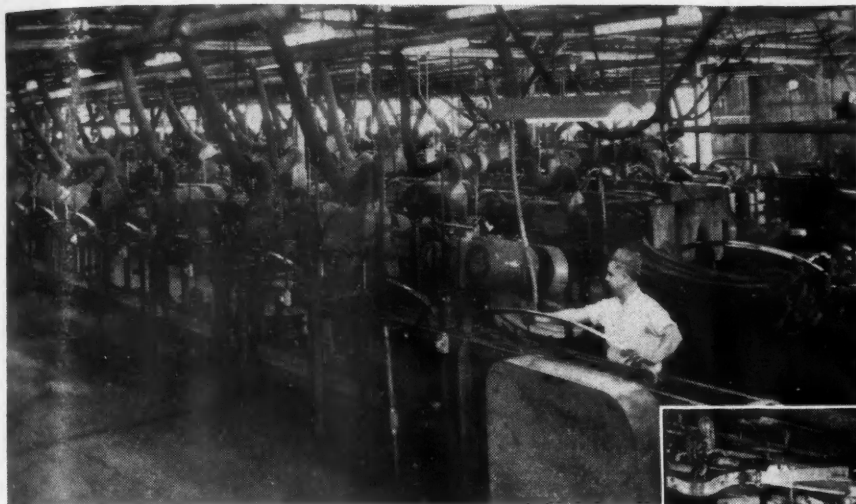
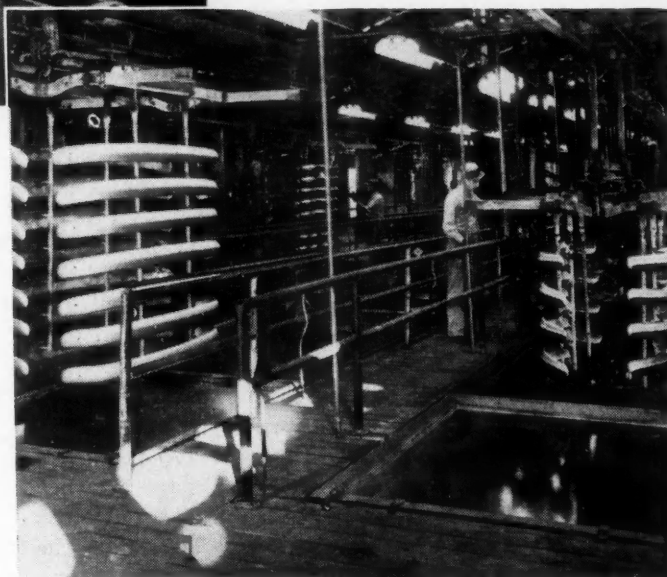


Fig. 3—(Left) Fixture-type conveyor for transporting bumpers under automatic polishing wheels.

Fig. 4—(Bottom) Mono-rail conveyor equipped with racks for carrying polished bumpers to plating tanks.



By Howard Laurent

Chief Engineer,
United States Spring & Bumper Co.

and Springs

This Article Tells What a Los Angeles Parts Manufacturer Has Done to Modernize Its Plant for Peacetime Competition

Assembling leaf springs is handled with a slat bench-type conveyor as shown in Fig. 2. This conveyor is 6 ft wide and 50 ft long. The assembly equipment used is spaced in the proper position along both sides of the conveyor. As the spring progresses it is greased, reamed, clipped, assembled, load tested and inspected previous to applying the covers. The speed of the conveyor is variable to accommodate the great number of springs processed. With this type of equipment 10 men are able to assemble an average of 175 springs per hour.

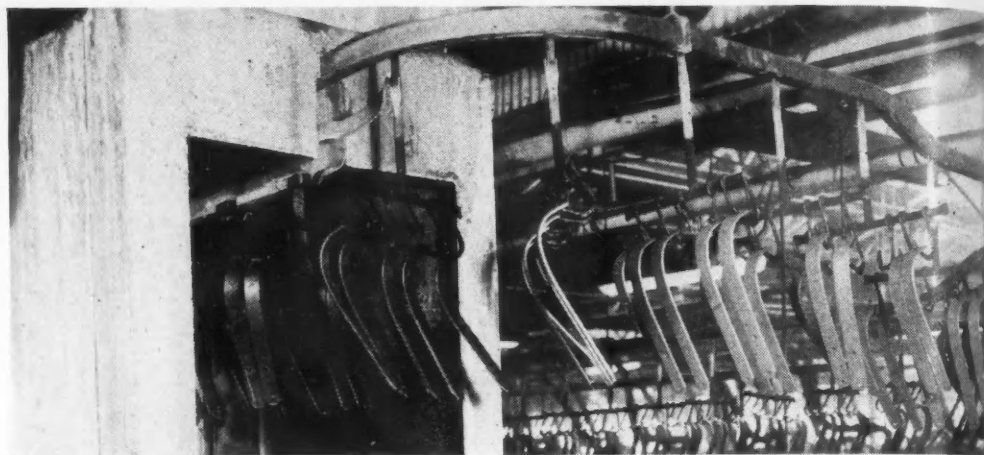
In quenching hot-formed or pierced parts, a slat-type conveyor conveys the parts from the oil bath. The speed of this type conveyor is always variable and can be set to remove the parts at the desired temperature preparatory to tempering. The quench tank permits continuous heat treating of a variety of parts.

For removing mill and forging scale prior to nickel plating



Fig. 5—Special type conveyor installed in inspection department.

Fig. 6—Hook-type monorail conveyor for transporting bumper brackets.



there are five tanks and an automatic conveyor which immerses the bumpers in each solution for the proper period of time. After they have gone through this cycle they are removed at the discharge end ready for polishing. Here again the speed is variable to allow sufficient time in the acid to remove all the scale, but not to allow pitting. Two men can handle 1500 to 2000 bumpers per day with ease. The entire unit is completely covered and exhausters fans exhaust the steam and fumes outside the building.

Fig. 3 shows bumpers being conveyed under automatic polishing wheels at the rate of 180 per hour. These parts are held in fixtures which are attached to a flat fabric belt covered with a thin strip of steel. The strip steel is used as a covering to protect the fabric against the sharp edges of the bumpers and the abrasive. This type of machine has 18 polishing wheels which completely polishes the full face of the bumper except the extreme ends. The fixtures are detachable and can be removed or mounted quickly for changing the size or type of bumper. The polishing wheels are mounted on a universal head which can be set at any angle necessary to polish all sides of

the face of the bumper. Hook conveyors are installed above the polishing machines to return the bumpers to the feed end, if further polishing is necessary.

The bumpers are conveyed from the finish end of the polishing machines through the hand finishing department to the nickel plating department by hook conveyors. Between these two departments is located the final inspection before plating. As each bumper passes an inspector, it is carefully checked for imperfections in the polish. Imperfect bumpers are carried back to the final finish polish where they are reworked and again put back on the conveyor for further inspection.

Polished bumpers are hung on racks which are suspended from a monorail conveyor, as shown in Fig. 4. At each of the tanks in the various operations a section of the monorail lowers by means of a rigid hoist to immerse the bars. In some of the rinse tanks the hoist reverses itself while on others it remains down for a predetermined time and then automatically rises. In the nickel plating tanks, the entire rack assembly is unhooked from the carrier and the carrier is returned to the monorail and moved over another rack. It is again lowered and the rack assembly attached. The entire unit is again raised to the track, and after plating, is carried to the buffing storage area on the original racks. After the bumpers are removed, a small pusher-type conveyor moves the empty plating rack to the accumulative area for reracking.

The plating racks are designed primarily to serve as a conductor of electricity; care must be exercised that no burned spots occur on the bumper from faulty contact. The monorail system must therefore move freely and with a minimum of jars or bumps which might dislodge the bumper from the plating hook. Also, since grease will contaminate the nickel plating solution, the lubri-

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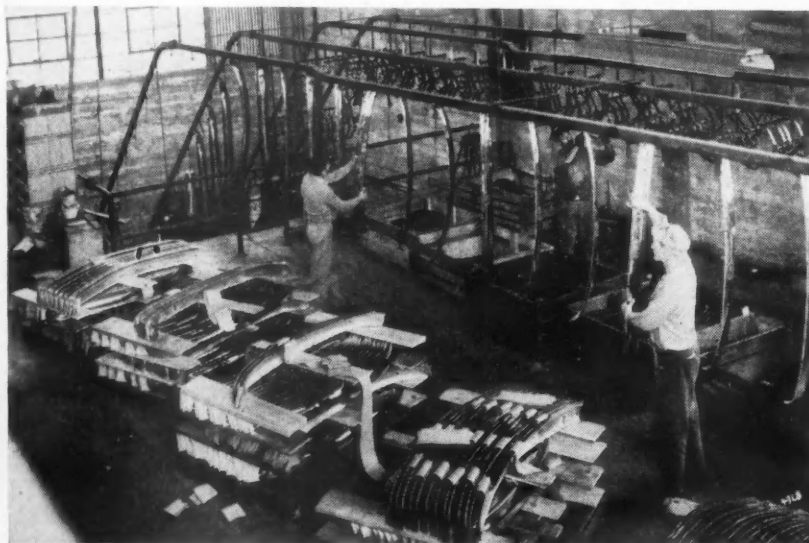


Fig. 7—Pallets for storing and shipping finished parts.

Quality Control at Cadillac

Based on Latest Methods

FOR quality control the Cadillac Motor Car Co. relies to a large extent upon human values as a supplement to techniques and instrumentation. Of the group of 24 inspection supervisors, the average length of service is 20.7 years per man. This is a circumstance regarded as an invaluable asset in providing experienced background and sound judgment as well as an established and cooperative organization. At the lower working level, out of a group of some 200 inspectors employed in the plant, the average service record is more than 11 years per man.

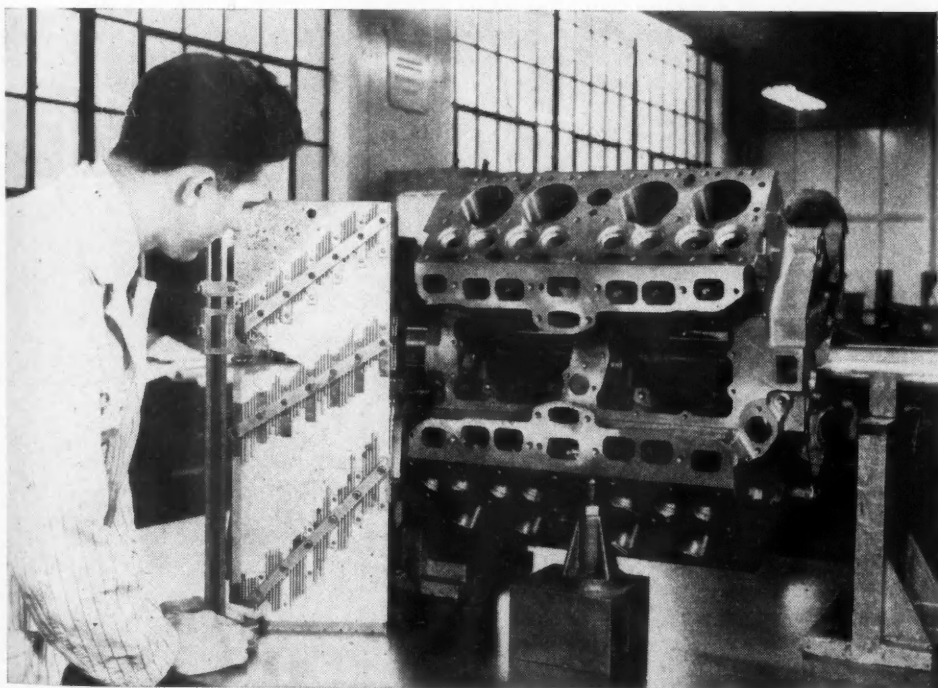
The inspection department, an autonomous group working directly under the works manager, includes the physical and chemical laboratory as part of its facilities, thus providing complete control of raw material, processed material and manufactured parts. It serves as an integral part of the manufacturing

establishment, and cooperates with both engineering and production in the establishment of practical standards of quality. This is implemented by the inclusion of inspection operations in all factory routings, and by the distribution of inspection manuals covering each of the major parts. Each manual covers every phase of the inspection of a given part and includes illustrations of each gage and fixture to be used by inspectors.

The basic philosophy of assuring quality in advance of manufacture, as contrasted with the older concept of acceptance or rejection of a finished part, has paid dividends at Cadillac. It has encouraged suppliers to do a better job in their own plants, thus increasing acceptance by the customer; and in Cadillac shops, it has demonstrated that the proper control of each manufacturing stage results in greater acceptance and fewer rejects.

One of the tangible results of this program is an actual reduction in the amount of inspection required on certain parts. Wherever control is assured, the inspection department finds it necessary only to have a sampling inspection or none at all. The amount of inspection naturally depends upon the nature of the part and its function. Some parts require 100 per cent checking while others are subjected to simple sampling. Essential to the success of the plan is constant watchfulness on the part of the staff to make sure that precise control is exercised at every step.

In advance of a new model year, or radical change in any of the components, the inspection department makes
(Turn to page 74)



Cadillac's unique method for checking cylinder blocks is claimed to require only eight hours as contrasted with the former procedure which took two weeks. All cylinder block dimensions are numbered and charted on master sheets. Each dimension is assigned a color indicating vertical, horizontal and angular positions of the crankcase. Master sheet colors and numbers match step pins mounted on a master block. To check a cylinder (as shown in the above photo), it is only necessary to transfer checking points from this master block to the cylinder block being checked. This is not a production check, but is used to maintain control of quality inspection in the shop.

New Machine Tools

By Joseph Geschelin

IN ANTICIPATION of an attendance of around 100,000 people from the U.S.A., Europe and the Far East, the National Machine Tool Builders' Association has reason to expect that the Machine Tool Show which will be held in the Dodge-Chicago plant in Chicago, Sept. 17-26, will be the greatest spectacle of its kind, with 2000 machine tools having a value of about \$16,000,000 on exhibition. This year's show is the fourth to be held by the NMTBA in a period of 20 years, the first one having been staged in 1927. Shows also were held in 1929 and in 1935 and another was planned in every detail for 1939 but was cancelled because of the war clouds over Europe.

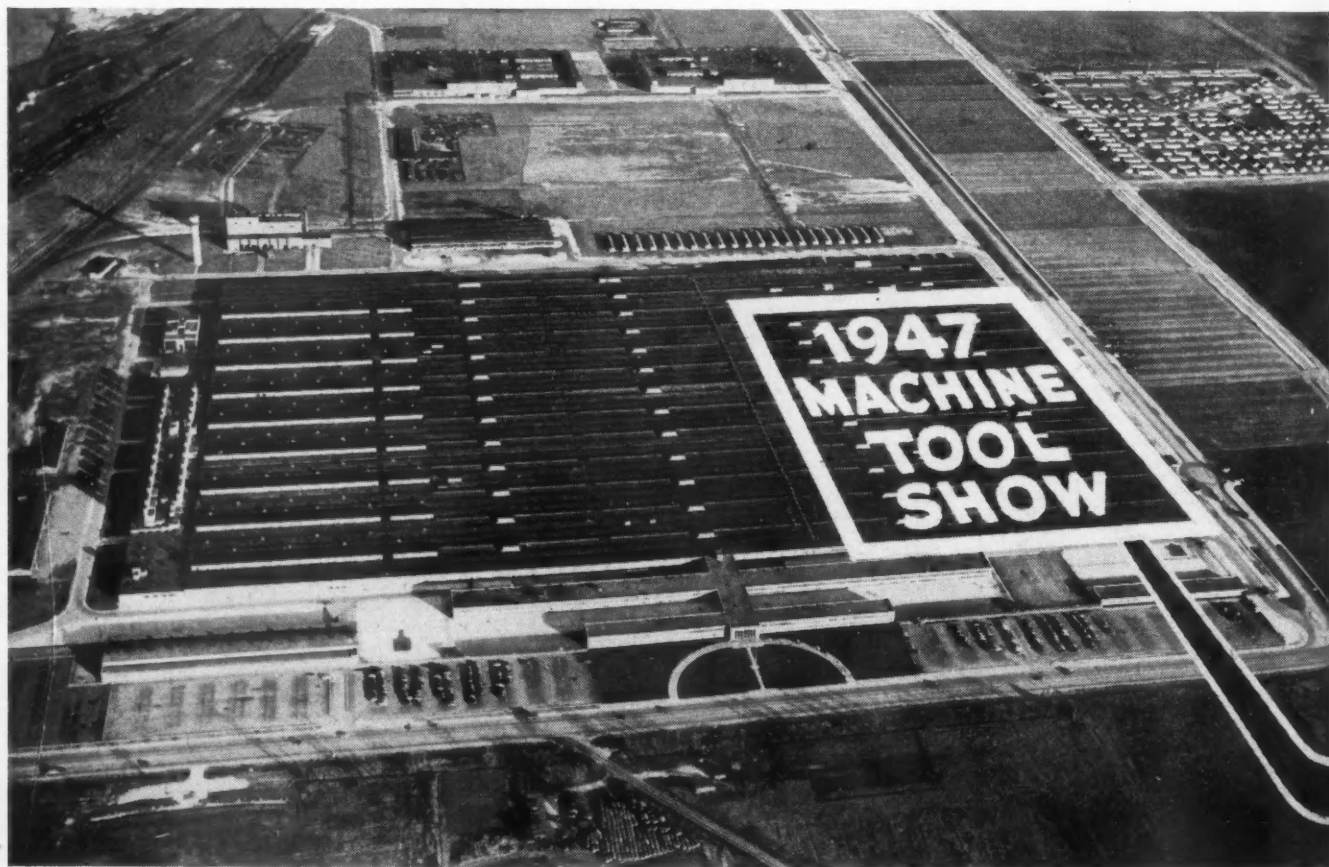
Although the number of exhibits cannot be stated exactly at present, it will undoubtedly total around 275, composed of about 150 machine tool builders and perhaps 125 manufacturers of related equipment. The Dodge-Chicago plant offers for the first time sufficient space to make the most of machinery displays. Total

space contracted for is 513,000 sq ft providing a net area of around 330,000 sq ft for exhibits.

The Tucker Corp., which has the plant under lease from WAA, has mentioned the possibility of setting aside the space used by the show as a permanent exhibit and convention area, with huge glass partitions separating the area from the rest of the building. This, of course, is in the nature of speculation at the moment.

So far as the show itself is concerned it is too early to discuss either the nature of the exhibits or the details of the advanced machinery that is to be shown for the first time. This will be covered completely in the Machine Tool and Production Equipment Issue (Sept. 1) of AUTOMOTIVE INDUSTRIES.

Section of the huge Dodge Chicago Plant at 74th St. and South Cicero Ave. where NMTBA Machine Tool Show will be held Sept. 17-26. (Chicago Sun Photo).



on Parade

Suffice it to say that many machine tool builders will announce for the first time their advanced models, groomed for present day management requirements, machines that have been on the boards for a long time. Some are a product of thinking that was interrupted by the war.

Stressing automaticity many of the new machines are designed to meet the challenge of lower costs despite higher direct labor and increased materials costs. Prominent among the exhibits will be examples of the transfer-type machine lines which are currently engaging the thinking of automotive production men. The largest existing installation is the one in operation at Buick. (See AUTOMOTIVE INDUSTRIES, Feb. 1, 1947.) Another interesting line is found at the Detroit Gear Div., Borg-Warner Corp., for the automatic machining of a four-speed transmission case. By the Spring of 1948 we anticipate the introduction of other transfer lines on a major scale.

Arrangements for publicizing the show to assure the attendance of interested people from all corners of the Globe were given mature consideration and have been placed in effect. An early mailing of a special promotion folder was made overseas to reach production men all over the world. Its distribution was handled through foreign machine tool dealers, steamship and airlines, travel agencies, and U. S. Consulates and Missions. Another folder for distribution in the United States and Canada has been widely circulated by exhibitors, machinery dealers, and others.

A distinctive touch has been added for the comfort of visitors. Each of the mailing pieces contains a hotel reservation blank and an advance registration card. By this means each visitor may be auto-

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Map of boulevards and good traffic streets showing location of Machine Tool Show on the outskirts of Chicago.



Novel

This article is a translation of a paper, "Knock Indicator Based on the Principle of Pressure Acceleration", by Dr. Ing. F. Lichtenberger, Powerplant Section, German Experimental Institute for Aviation, which appeared in the VDI Zeitschrift for March 21, 1942.

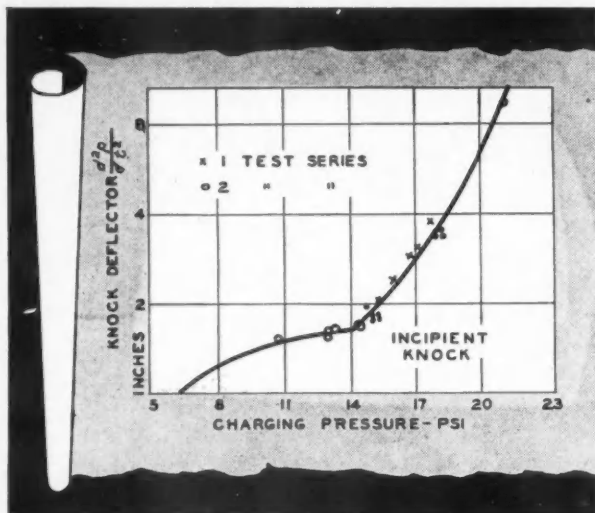


Fig. 1—Curve of knock acceleration vs charging pressure. The point of incipient knock as determined by ear varied between 12.9 and 14.0 psi.

A UNIQUE method of determining accurately just where an engine begins to knock was developed by the German Experimental Institute for Aviation in Berlin during the war. The method is based on the principle of pressure acceleration, and utilizes a piezoelectric pickup, amplifier, and oscillograph to obtain a complete curve of pressure acceleration vs charging pressure. This curve, which gives a positive and objective determination of the point of incipient knock, is independent of absolute deflection; and therefore is independent of the sensitivity of the equipment.

There is little difference between pressure-time diagrams obtained under conditions of knocking and non-knocking operation, respectively; and there is particularly little difference between the maximum cylinder pressures obtained under the two conditions. For that reason, if cylinder pressure p is differentiated with respect to time t , this derivative dp/dt in psi per sec per sec will give greater sensitivity of the deflection with respect to knock. However, it is still not sufficiently sensitive, as the magnification of the deflection representing dp/dt attains values of from 4 to 10 at the most. A still higher sensitivity can be obtained by an additional differentiation, giving values of d^2p/dt^2 , in psi per sec per sec. The deflections representing d^2p/dt^2 may be multiplied a hundred times when passing from non-knocking to knocking operation. Fig. 1 is a curve of knock acceleration vs charging pressure. The physical explanation of the large increase in deflection is as follows: the second differentiation represents measurement of a curvature. Since the radius of curvature of the peak of the pressure-time curve changes greatly when passing from non-knocking to knocking conditions, this sensitivity to knock

must show up in the second derivative (see Fig. 2).

It is possible to calibrate the pickup, amplifier and oscillograph in such a way that the deflections can be read directly in psi per sec per sec. This procedure, however, is rather involved; and it does not give exactly what is wanted, because the point of incipient knock is not determined by a fixed psi per sec per sec, but varies widely with the grade of fuel.

The novelty of this method of knock detection lies in the evaluation procedure, which does not consist of a comparison of deflections obtained at two engine settings, but of a determination of the point where knock

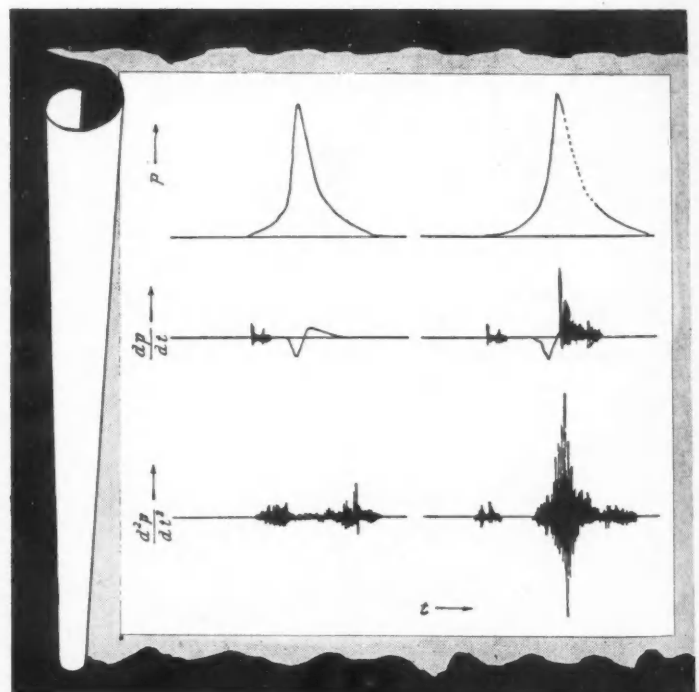


Fig. 2—Diagrams obtained with the knock indicator, showing both knocking and non-knocking conditions for pressure vs time (top); first differentiation of pressure vs time (middle); and second differentiation of pressure vs time (bottom).

Method of Determining Incipient Engine Knock

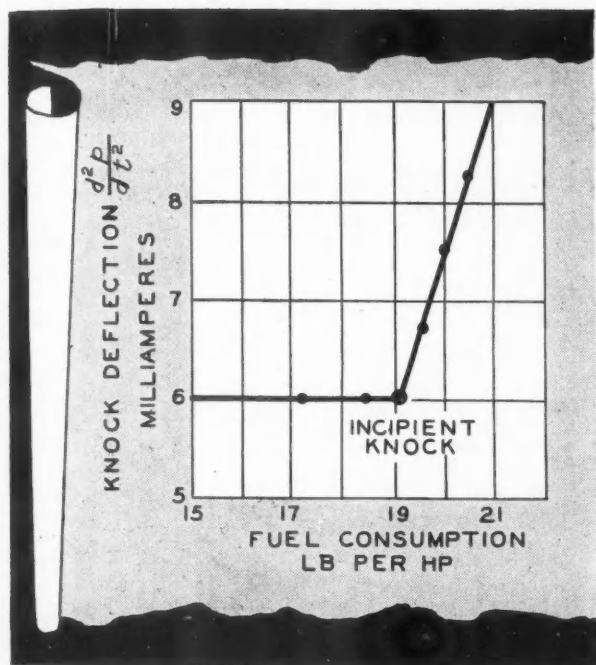


Fig. 3—Curve of knock deflection in milliamperes vs charging pressure.

begins on a curve covering the whole range of operation. To this end, the values of $\frac{d^2p}{dt^2}$ are plotted as ordinates against some factor of engine operation, such as the charging pressure, which increases with increased knock. These values may be measured with a sensitivity which need only be substantially constant. All other factors of engine operation must be held rigidly constant. In this way a curve of $\frac{d^2p}{dt^2}$ vs this operating factor is obtained which is characterized by a sharp break or deviation. This break, which represents the point of incipient knock, has been found in practically all curves obtained from tests extending over a number of years. If occasionally it could not be found, it was later discovered that the engine had not begun to knock or that mistakes had been made in setting or adjusting the engine or the amplifier; that is, not all of the operating factors except the one purposely changed had remained constant. In the case of fuel-test variable-compression engines, the compression

ratio may be used for the scale of abscissas. With increase in the compression ratio, the compression pressure and with it the knocking tendency rises, not linearly, but according to an exponential function. In this case, the junction between the two parts of the curve quite often is not as sharply defined as in the one previously considered, still it can be located with sufficient accuracy.

Even in cases where changes in the charging pressure or in the compression ratio cannot be effected by such simple means as in fuel-test engines, the knock-indicating method based on pressure acceleration has proven entirely successful. For instance, it is possible to trace variations of incipient knock with fuel consumption. The knocking range is then indicated by two bends in the knock curve as shown in Fig. 4. This method is directly applicable to complete engines and has yielded faultless results in tests carried out in collaboration with the German aircraft-engine industry.

The piezoelectric pickup indicator is in contrast to certain other indicators in that there is no air pocket formed in front of the pressure-sensitive element,

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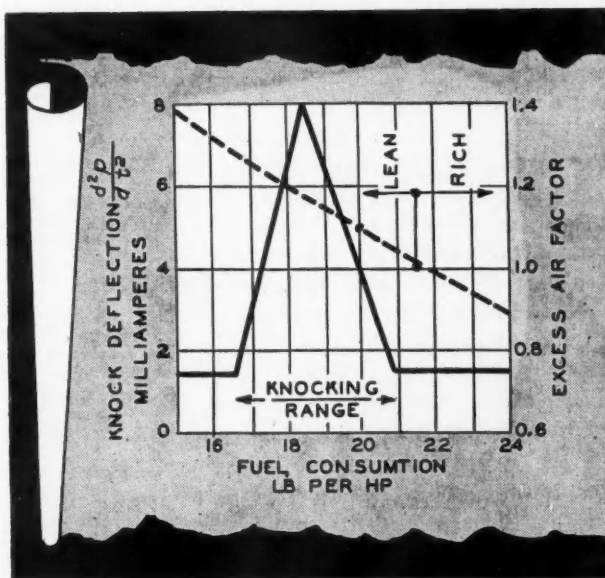


Fig. 4—Curve of knock deflection vs fuel consumption.

Briggs Adopts Special Lacquer-Drying

*Direct-Fired Recirculating Air Units Now in Use
for All Drying Operations at Conner Plant in De-
troit, Recently Converted from Airplane Parts
Manufacture to Automobile Body Assembly*

ERECTED prior to the war for the manufacture of airplane structural parts, sub assemblies and complete B-29 wing sections, the Conner Plant of Briggs Manufacturing Co., Detroit, Mich., recently was converted to house one of the latest body assembly plants in the industry. It handles the assembly, painting, and complete trim of a full line of bodies for one of the leading motor car producers. Starting with stampings made in the Briggs Mack Plant, the Conner operation produces finished bodies ready for installation on the final assembly line of the customer.

Perhaps one of the most impressive things about this plant is the second floor layout which is designed for the most efficient handling of the multiplicity of operations that enter into the painting of modern bodies. Its distinctive feature is a comprehensive installation of direct-fired recirculating air ovens for all drying operations. This type of equipment, developed by Surface Combustion Co. in cooperation with the Briggs Plant engineering department, is said to mark the most important advance in drying for postwar operations.

Before considering the details of these ovens it may be well to mention that the bodies produced in this plant are finished in lacquer rather than synthetic enamel. This is important if one attempts to compare this installation with those designed for drying synthetic finishes. The point is that neither drying speed nor high temperatures are stressed since they are



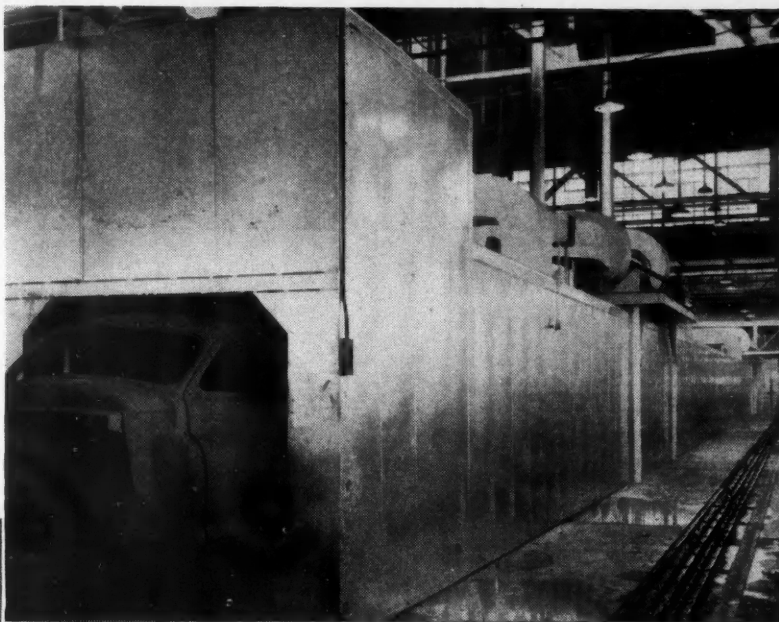
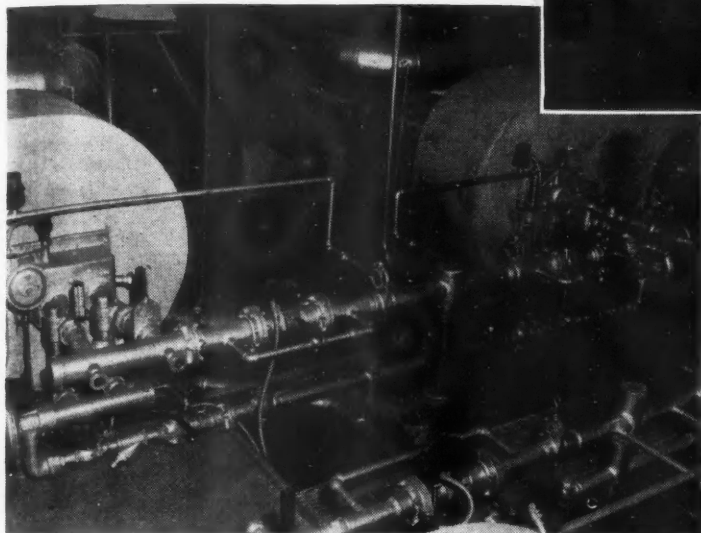
Fig. 1—Interior of one of the direct-fired ovens with body on the conveyor. The nozzles through which heated air is forced downward to the floor are in rows on each side at the ceiling. Air is removed from the oven through the central duct and returned to the burners for recirculation.

limited by the characteristics of the finishes specified by the customer and, therefore, limit the optimum capabilities inherent in the new equipment. At the present time the chief virtue of these direct fired ovens is their high fuel economy and almost perfect efficiency as compared with indirect heated steam ovens.

The principle on which the operation of the direct-

By Joseph Geschelin

g Ovens



(Above)

Fig. 3—Perspective view of one of a typical oven gives some impression of its length and cleanliness. The heating and circulating units may be seen mounted on the roof of the unit.

(Left)

Fig. 2—Taken on the roof of one of the ovens, this photograph shows the detail of the Surface-Combustion units containing gas-fired burners and circulating fans, as well as provisions for control.

fired ovens is based may be visualized from Fig. 1, showing the interior of one of the units. Heated air, held to an accurately controlled temperature, is forced by blowers through a series of nozzles which may be seen projecting from the ceiling of the oven on each side. The stream of heated air is forced downward to the floor, swirls around the body and is exhausted through the duct at the ceiling directly in the center of the booth.

The gas-fired burners and circulating fans are mounted compactly over the roof of the ovens as shown in Fig. 2. This may be considered as a closed heating system constantly circulating a heated atmosphere consisting of recirculated air, products of combustion of the burners, plus an adjustable volume of fresh air makeup. It may be seen that the economy of the arrangement comes from the full utilization of the atmosphere circulated through the burners.

Fig. 3 gives some impression of the length of a typical oven with the burners seen in the background and a body leaving the plenum chamber. Bodies are mounted on steel trucks and are transported along an extensive system of floor conveyors.

Precise control and flexibility come from the zoning of the ovens. This consists of an entry zone in which

the work is brought up to baking temperature as rapidly as the finish permits, followed by one or more holding zones, and an exit zone. The principle of zoning with individual heating and ventilating units for each zone reduces the size of fans and blowers and facilitates their mounting overhead. Moreover, since the supply and return ducts can be built into the roof, it is possible to keep the floor and side walls clear in the interest of good housekeeping.

At this point it may be noted that the modern design of the building has had a lot to do with the practicability of making a clean and accessible installation of these ovens. Outwardly, the Conner building has the appearance of a four-story structure. Actually it has only two floor levels, but each one has a ceiling height corresponding to two stories. This provides extensive space overhead, facilitates the use of equipment of any size, promotes excellent working conditions.

Coming to the details of the paint shop equipment, the second floor layout at the present time contains 16 of the Surface-Combustion direct-fired recirculating air ovens made up in various lengths, depending upon the nature of the operation. For example, the two

(Turn to page 62, please)

New Method of Computing Effective Valve Area

By Edward G. Ingram

EFFECTIVE valve area" is the term applied to the area at the point of greatest restriction to the flow of gas through the valve. This corresponds to the lateral area of a truncated cone of revolution of which a line, BC in Fig. 1, from the clear or small diameter of the valve to the seat is the generatrix. The usual formula used for computing this area of poppet valves is:

$$a = \pi (d_s h \cos \theta + h^2 \cos^2 \theta \sin \theta) \quad (1)$$

Where a is the effective valve area; d_s is the clear or small diameter of the valve; h is the lift, and θ is the angle of the seat. This formula is based on the assumption that BC is perpendicular to the valve face AB, but this only is true up to a certain point in the lift. As the valve rises, the point C moves up the valve seat and both BC, the slant height, and CC', the diameter of the lower base of the truncated cone, increase. Formula (1) applies up to where point C is the upper limit of the valve seat, Fig. 2. From here on it fails because point C remains stationary, the angle ABC is no longer a right angle, and the diameter CC' remains equal to the large diameter of the seat, which is the same as the large or head diameter of the valve AA' or d_l , Fig. 3. In this case the area given by (1) is that of a truncated cone with the smaller slant height BF and the larger lower base diameter FF', which is incorrect.

The last point in the lift for which (1) applies, h_f , depends on the seat angle θ , and the width of the valve seat CD, this width being equal to the width of the valve face AB, which for a given angle θ is determined by the large and small diameters of the valve, d_l and d_s . In Fig. 2,

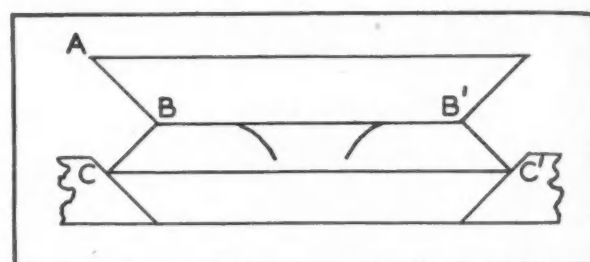


Fig. 1—The line BC from the small diameter of the valve to the seat is assumed to be perpendicular to the valve face AB when computing the effective valve area by the usual formula

$$AW = 1/2 (AA' - BB') = 1/2 (d_l - d_s)$$

$$AB = \frac{AW}{\cos \theta} = \frac{1/2 (d_l - d_s)}{\cos \theta}$$

By definition $CD = AB$

$$BD = h_f = \frac{CD}{\sin \theta} = \frac{1/2 (d_l - d_s)}{\cos \theta} \div \sin \theta$$

$$h_f = \frac{1/2 (d_l - d_s)}{\sin \theta \cos \theta}$$

If $\theta = 45$ degrees, $h_f = d_l - d_s$.

If $\theta = 30$ degrees, $h_f = 1.155 (d_l - d_s)$.

Table 1. Comparison of Effective Valve Areas as Computed by Conventional Formula and New Formula

Valve No.	Large Valve Diameter d_l	Small Valve Diameter d_s	Lift h	Seat Angle Degrees	Area by Formula (1)	Area by Formula (2)	Per Cent Error With Formula (1)
1	1.500	1.275	.343	45	1.101	1.118	1.5
2	1.500	1.375	.343	45	1.178	1.298	9.3
3	1.620	1.370	.531	45	1.928	1.996	3.4
4	1.175	1.500	.347	45	1.289	1.302	0.1
5	2.500	2.250	.500	45	2.765	2.947	6.2

Effective Valve Area

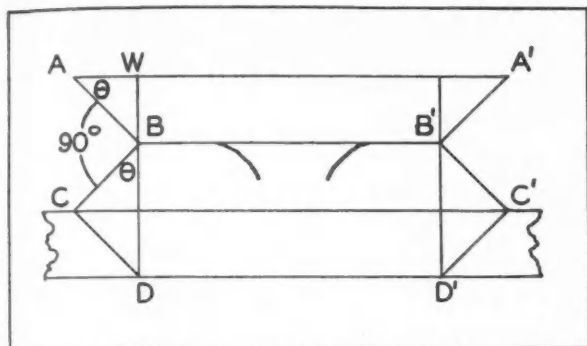


Fig. 2—In this figure, the position of point C is shown as the upper limit of the valve seat. As the valve rises beyond this condition, line BC no longer remains perpendicular to AB and the usual formula for computing the valve area cannot be used with accuracy

In practice, most valves with a 45 degree seat and some with a 30 degree seat do lift considerably higher than this.

For lifts higher than those to which (1) applies, a formula for the effective valve area may be obtained as follows (see Fig. 3):

$$BX = AW = 1/2 (d_t - d_s)$$

$$AX = BX \tan \theta = 1/2 (d_t - d_s) \tan \theta$$

$$CX = AC - AX = h - AX = h - 1/2 (d_t - d_s) \tan \theta$$

$$BC = \sqrt{\left[1/2 (d_t - d_s)\right]^2 + \left[h - 1/2 (d_t - d_s) \tan \theta\right]^2}$$

$$a = \pi \frac{d_t + d_s}{2} \times \sqrt{\left[1/2 (d_t - d_s)\right]^2 + \left[h - 1/2 (d_t - d_s) \tan \theta\right]^2} \quad (2)$$

Comparative figures for the effective valve area of some typical valves as obtained by (1) and (2) are given in table No. 1. All have 45 degree seats and lifts sufficient to require formula (2). The percentage of error when using (1) is shown in each case; and it will be noted that the discrepancies are either small or negligible.

It may be pointed out that with a given lift the narrower the valve face is made the sooner (1) will fail and the greater will be the error. Also, with a given width of face the error increases with an in-

(Turn to page 68, please)

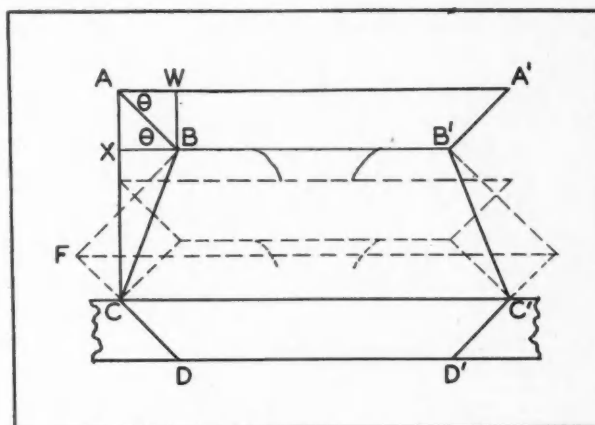
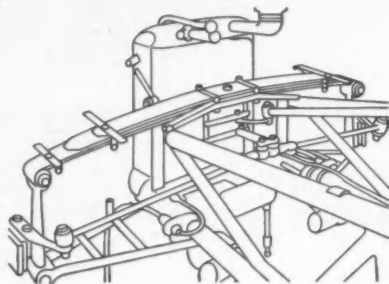


Fig. 3—As shown here, most valves with a 45 degree seat and some with a 30 degree seat lift higher than the limiting position of point C

Table 2. Comparison of Effective Areas of Valves with 45°, 30° and Flat Seats

No.	Large Valve Diameter d_t	Lift h	Face Width AB	45 Degree Seat			30 Degree Seat				Flat Seat		
				Small Valve Diameter d_s	Formula Used	Area a	Small Valve Diameter d_s	Formula Used	Area a	Per Cent Gain in Area Over 45° Seat	Small Diameter d_s	Area a	Per Cent Gain in Area Over 45° Seat
1	1.750	.347	.177	1.500	2	1.302	1.443	1	1.504	15.5	1.396	1.522	16.9
2	1.500	.343	.088	1.375	2	1.298	1.347	2	1.382	6.5	1.323	1.428	10.0
3	1.750	.100	.177	1.500	1	.344	1.443	1	.404	17.5	1.396	.439	27.6
4	1.500	.100	.088	1.375	1	.316	1.347	1	.316	19.6	1.323	.416	31.6



This line drawing shows the general arrangement of the front end suspension on the Cisitalia sports car.

(Below) Body and sheet metal design of this Cisitalia car is based on aerodynamic form and low frontal area.



Cisitalia 105 Mph Sports Car

Lightweight Cisitalia and Maserati Models Are Powered by 50 Hp and 65 Hp Engines. Moretti Announces Two-Passenger Cabriolet.

AN ITALIAN automobile producer, Cisitalia, has recently introduced a new lightweight sports car which is claimed to go 105 mph with a 50 hp engine. This car, which is being built at Turin as a coupe and a roadster, is similar in design and construction to the single-seater racing car already being produced by Cisitalia. The coupe is stated to have a gross weight of 1543 lb, and the roadster, 1433 lb. In the racing versions, known as the Mille Miglia, these weights are reduced to 1433 and 1322 lb respectively.

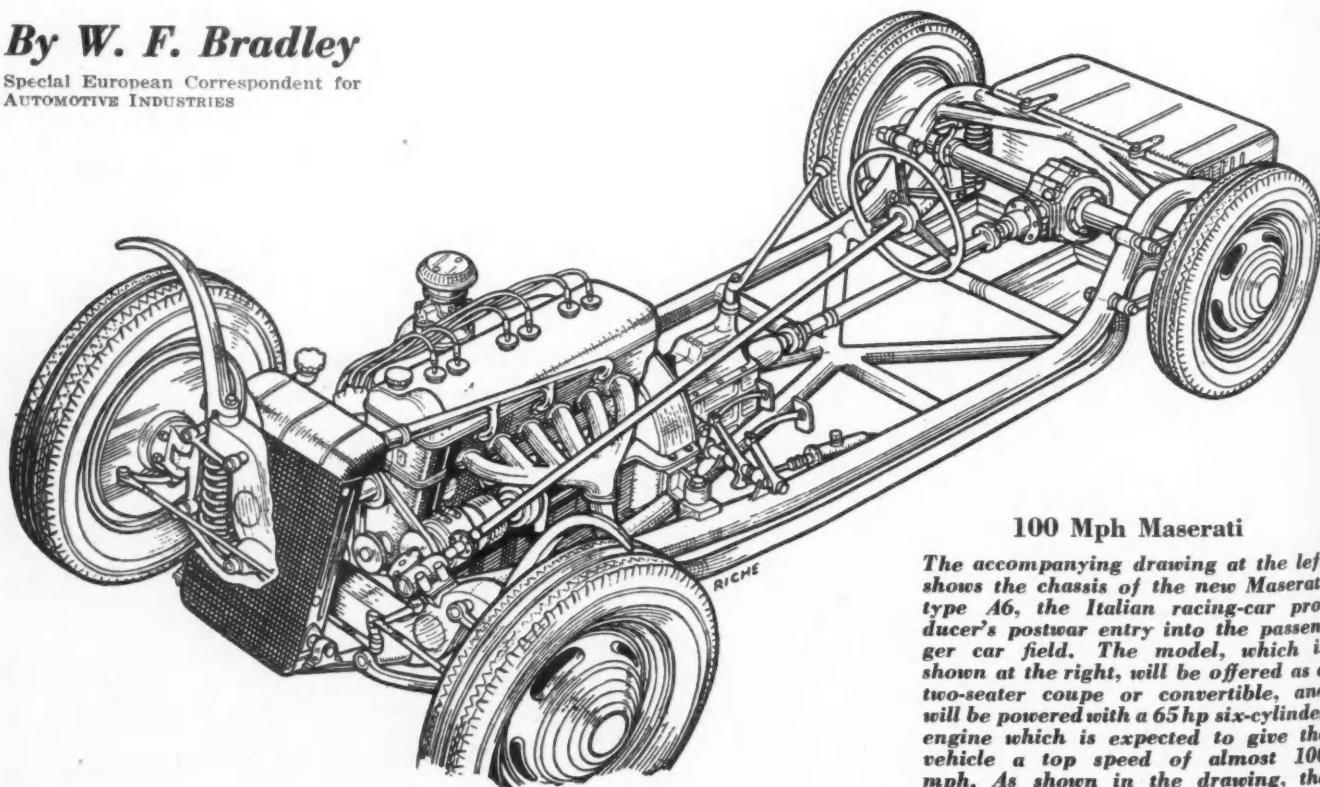
A 66.7 cu in. four-cylinder engine of 2.68 by 2.95 in. bore and stroke is used, with cast iron cylinders and

crankcase, aluminum-alloy head with insert valve seats, overhead valves with pushrod operation, and a three-bearing shaft with copper-lead for both the main and the connecting rod bearings. With a compression ratio of 7.22 to 1, the output is stated to be 50 hp at 5500 rpm. On the racing model, the power is increased to 60 hp without change of rpm. This is done by enlarging the inlet valves and raising the compression ratio to 9.5 to 1. In addition, the valves on

Italian

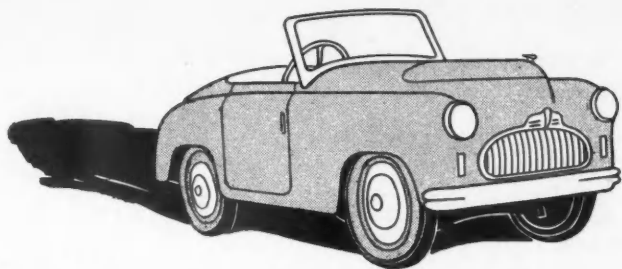
By W. F. Bradley

Special European Correspondent for
AUTOMOTIVE INDUSTRIES



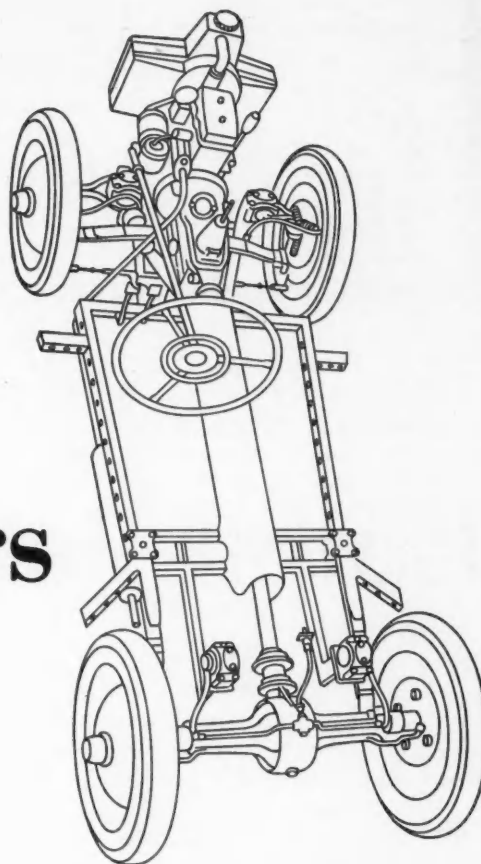
100 Mph Maserati

The accompanying drawing at the left shows the chassis of the new Maserati type A6, the Italian racing-car producer's postwar entry into the passenger car field. The model, which is shown at the right, will be offered as a two-seater coupe or convertible, and will be powered with a 65 hp six-cylinder engine which is expected to give the vehicle a top speed of almost 100 mph. As shown in the drawing, the



Moretti Utilitarian Car

Another small Italian car is the Moretti, a two-passenger cabriolet which has been designed to provide low cost transportation. It has been under development for almost three years and now is in limited production at Turin. The suspension system consists of a transverse leaf spring and upper control arms with built-in shock absorbers at the front, and at the rear a longitudinal leaf spring extension from each frame side rail to the rear axle. Other design features are hydraulic brakes, flush type door handles, two-cylinder, valve-in-head engine of 17.5 cu in. displacement, and a four-speed transmission. These two illustrations show an exterior view and a line drawing of its chassis.

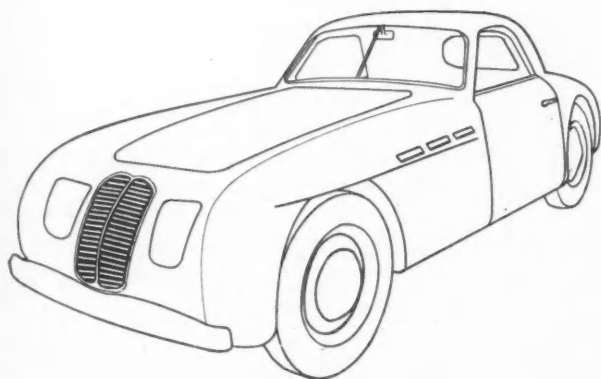


High Speed Cars

the Mille Miglia type are sodium cooled.

Aluminum with cooling ribs is used for the oil sump. A feed and a scavenger pump are provided, as well as an oil radiator under the water radiator. A single Zenith carburetor is used; and ignition is through a Marelli distributor driven off the camshaft.

For the frame construction, use is made of high-alloy molybdenum steel tubes. Front wheels are independently sprung by transverse spring and lower wishbones, assisted by telescopic hydraulic shocks. A rigid rear axle is used, with an anti-roll stabilizing bar. The axle is of pressed steel construction with helical differential gears, ratios being 3.91 to 1 for the sports and



chassis frame makes use of tubular members both longitudinally and transverse. These are rigidly reinforced by x-shaped bracing, also of tubular members, which terminate in a large stamping that constitutes the front cross-member. Suspension at front and rear is by coil springs, with unequal wish bones at the front and double trailing arms at the rear. The six-cylinder engine, an inclined over-

head-valve design, is provided with a dual-choke down-draft carburetor and develops its 65 hp at 4700 rpm. at a compression ratio of 7.8 to 1. Engine displacement is 91 cu. in., with a 2.6 in. bore and 2.85 in. stroke. The car has a 100 in. wheelbase and weighs 1712 lb. The body is made entirely of light metals.

(Chassis drawing reproduced by courtesy of THE MOTOR).

3.25 to 1 for the racing models. A four-speed transmission is provided with synchromesh on third and fourth. Brakes are hydraulically operated, having a drum diameter of 9.8 in. and 1.57 in. shoes. A riveted duraluminum gasoline tank is used, with normal feed to the carburetor by diaphragm pump. Speed claims are a maximum of 105 mph for the sports models and 124 mph for the Mille Miglia versions. Wheelbase for the sports cars is 94 in. with a tread of 49.5 in. in front and slightly less at the rear.

The racing model is a single seater with a three-speed transmission and a clutch pedal selector for second and third gears. There is a step down between the transmission and the open, balanced, tubular drive shaft to reduce the speed of the latter. Front suspension

is by a transverse spring with wish bones, while the rear layout comprises torsion bars and vertical coil springs designed to eliminate lateral movement. Wire wheels with duralumin rims are fitted and carry 4.00-15 tires in front and 5.00-15 on the rear. Body is made entirely of aluminum; wheelbase of the car is 78.74 in., tread 48.22 in. and total dry weight 815 lb.

Table I Analysis of Non-Regenerative Gearing

$$\left(\text{When } M = \frac{R_D}{S_D} + 1 = 4\right)$$

1	2	3	4	5	6	7	8	9	10	11	12
T _q Out T _q Cage	T _q Sun	T _q Rotor and Ring Gear	T _q Imp.	T _q Stator	Hyd. T _q Multiplication	Overall T _q Multiplication	Hyd. RPM Ratio	Hyd. Eff. %	Rotor RPM	RPM Out	Overall Eff. %
100	25	75	75	0	1:1	1:1	0.930	93	930	950	95
150	37.5	112.5	82.5	50	1.8:1	1.5:1	0.417	75	412	562	84
200	50	150	50	100	3:1	2:1	0.100	30	100	325	65
240	60	180	40	140	1.5:1	2.4:1	-0.333	-150	-333	0	0

Part I

By A. Y. Dodge

A. Y. Dodge Co.

An Analysis of Epicyclic Gear Systems For Torque

THE planetary or epicyclic gear transmission, widely used in early American passenger cars, has recently come back in favor, and is now being applied to both American and foreign designs of automatic transmissions. In this country, General Motors Hydramatic incorporates planetary gears, and the automatic overdrive of Borg-Warner utilizes the epicyclic principle. In England, the Wilson epicyclic gear transmission has been used extensively, particularly in combination with fluid couplings.

Since little has been published on this phase of transmission gearing, this article will present a comprehensive analysis of the epicyclic gear systems and their application to hydraulic couplings and torque converters. Part I covers a general description and explanation of the different classes, and Part II, which will appear in an early issue of AUTOMOTIVE INDUS-

TRIES, will present a more detailed analysis of gear speeds, torque and tooth loads.

Classes of Planetary Gears

The several different arrangements of planetary gears may be divided into three distinct classes: a plain mechanical reduction gear in which one element of the planetary gear is held fixed; a regenerative system in which all three elements of the planetary or differential gears are turning with part of the power passing back through the differential into the driving shaft; and a non-regenerative system in which all three elements of the planetary gear are turning, but with the parts so connected that the power is divided into two distinct paths and so that none of the power returns to the driving shaft. A system of planetary gears usually falls under only one of these classifications, but by bringing about a change of rotation or a change in hook-up, it is entirely possible that the same system may fall under two or all of the three classes.

In the non-regenerative gearing arrangement, the power divides so that the power handled by one path plus the power handled by the other path always equals the power input. The internal power load imposed on one or either path is always less than the input power load. During forward drive, the reaction torque always tends to turn the input shaft in a direction opposite to the movement of the prime mover. The reaction gear usually turns against the reaction force. In addition, non-

Table II Analysis of Regenerative Gearing

$$\left(\text{When } M = \frac{R_D}{S_D} + 1 = 4\right)$$

1	2	3	4	5	6	7	8	9	10	11	12
T _q Out T _q Ring	T _q Sun	T _q Rotor and Cage	T _q Imp.	T _q Stator	Hyd. T _q Multiplication	Overall T _q Multiplication	Hyd. RPM Ratio	Hyd. Eff. %	Rotor RPM	RPM Out	Overall Eff. %
100	-33	133	133	0	1:1	1:1	0.93	93	930	907	90.7
135	-45	180	145	35	1.24:1	1.35:1	0.614	76	614	486	65.3
225	-75	300	175	125	1.72:1	2.25:1	0.437	75	437	249	56.0
300	-100	400	200	200	2:1	3:1	0.325	66	325	100	33.3

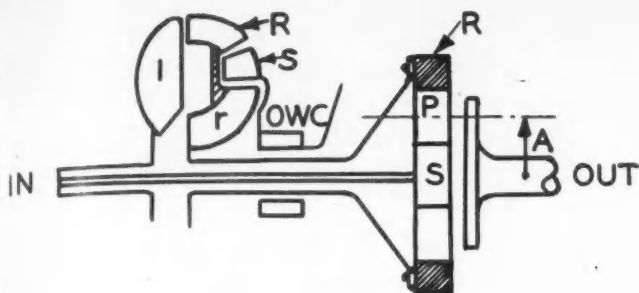
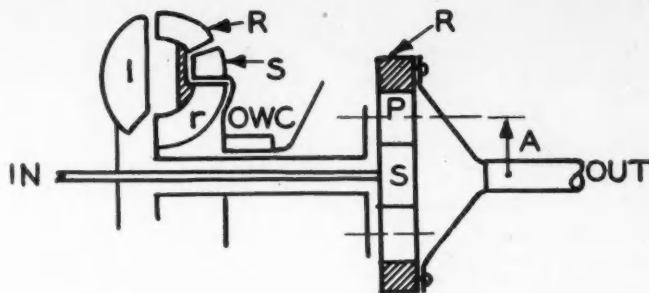


Fig. 1—(Above) Planetary transmission of non-regenerative class, arranged with a hydraulic torque converter.

Fig. 2—(Above-right) Planetary transmission of regenerative class, arranged with a hydraulic torque converter.



Converters

regenerative arrangements tend to increase the efficiency so that the overall efficiency is greater than the efficiency of the variable speed device. By efficiency is meant the ratio of power output to power input.

In the regenerative gearing arrangement, the power does not divide (although it might look as though it should) but travels in a circuitous path, with a portion of it coming back through the path. The power load imposed on the combined circuit always exceeds the power input and, in extreme cases, approaches infinite power imposed on one or both branches. During forward drive, the reaction torque always tends to turn the input shaft in the same direction as the prime mover is moving. The reaction gear usually turns with or in the direction of the reaction force. Regenerative circuits tend to reduce the efficiency—the overall efficiency is always less than the efficiency of the variable speed device. Regenerative hook-ups should be avoided when a non-regenerative system can be used. However, when properly analyzed and designed, a regenerative system will give a large reduction in a small space with few gears. Power output can not exceed power input, but in the case of regenerative hook-ups several of the parts may transmit within the circuit more power than is put in or taken out.

Non-regenerative and regenerative systems may be analyzed from the input speed and the limit of input torque, which are usually known. The output speed then can be calculated. The maximum output torques may be assumed and later verified. With the maximum torque known, the torque and tooth load on each gear may be found, also the revolutions of each gear. This

is usually more easily approached working from the cage or planet carrier through each gear to the input or output member. Oftentimes the possible output torque is limited by conditions such as traction, and in some cases might be less than input torque times the gear (torque) ratio. Formulae and rules for calculating speeds, torque and tooth loads occurring in various types of planetary gears will be given in Part II of this article.

The above rules are not meant to imply that a planetary gear cannot be set up to operate under more than one arrangement class. In cases where the prime mover or the continually variable speed element are reversible or, better still, both reversible as to direction of rotation and reversible as to direction of power flow, it is entirely possible that one planetary gear may be employed in all three manners.

A few transmission designs might appear in which a differential planetary gear is caused to change from a regenerative or a mechanical series into a non-regenerative arrangement. There have been some patents issued on such arrangements. The use of a planetary in first one way and later in another makes possible desirable changes in characteristics and leverage with a lesser number of gears. Also, it might be of interest to know that there are very few, if any, expired patents and a number of unexpired patents on non-regenerative differential arrangements, whereas there are a number of expired patents on regenerative differential arrangements.

A non-regenerative planetary transmission with a hydraulic torque converter is shown in Fig. 1. The torque-converter impeller and the sun gear of the planetary transmission turn with the engine, while the ring gear of the transmission turns with the rotor of the torque converter. In the transmission, the sun gear is shown at S, ring gear at R, planet at P. In the hydraulic converter, I indicates the impeller, R the primary rotor, r the secondary rotor. The stator at S is connected to a one-way clutch. Pitch diameters are as follows: S = 2 in.; P = 2 in.; R = 6 in. The radius R is 2 in.

An analysis of the non-regenerative gearing shown in Fig. 1 is made in Table 1. The output torque values in column 1 are assumed, as is a constant input torque of 100 lb-ft and a constant input speed of 1000 rpm. The other figures in this table are derived therefrom and form an analysis of the conditions imposed on the various elements.

Since the output shaft is connected to and moves with the cage, the analysis can easily be started at this point. For instance, it is apparent that the sun torque, column 2, will equal one-fourth of the output torque. Likewise, it is apparent that the ring torque, column 3, will be 75 per cent of the output torque. Since the engine has only 100 lb ft of torque, and since the sun gear has delivered a portion of this torque, the impeller torque, column 4, must be the engine torque less the torque transmitted by the sun. The torque of the stator, column 5, must be equivalent to the difference between the rotor torque less the impeller torque. It also must be equal to the difference between the output torque and engine torque. Since the stator torque in this case must comply to the two above conditions, this column forms a good check on the preceding columns.

Column 6 is column 3 divided by column 4; and column 7 is the output torque divided by the input torque. Column 8 is the rotor speed from column 10 divided by the input speed. In column 9 are given the efficiencies of the variable speed unit at the hydraulic torque ratios involved to zero efficiency, at which point the rotor is stalled. From these known figures can be calculated the rotor rpm, given in column 10, as follows:

$$\text{Rotor rpm} = \frac{1000 \text{ rpm}}{\text{Hyd. torque ratio}} \times \frac{\text{Hyd. Eff. \%}}{100}$$

By means of this gear arrangement, the rotor turns at a slower rate than does the output shaft at all times as shown by values in column 11, obtained as follows:

$$\text{Arm Rev. (rpm output)} = \frac{\left(\frac{R_D}{S_D}\right) R_{\text{Rev}} + S_{\text{Rev}}}{\left(\frac{R_D}{S_D} + 1\right)}$$

where R_D = ring gear diameter
 S_D = sun gear diameter
 S_{Rev} = sun gear revolutions.

The period of torque multiplication is prolonged due to the reduced rate of rotor rpm in relation to the output member, this being one of the advantages of a non-regenerative arrangement.

The overall gear efficiency, column 12, should be equal to the overall torque ratio times the overall speed ratio. It should be equal to the algebraic sum of the per cent of power conducted through the first path multiplied by its efficiency plus the per cent of power passing through the second path multiplied by its efficiency.

Convenient formulae for finding the speed of any or all elements of several different types of planetary gears when all members are turning are given in the appendix. Formulae by which torque and tooth loads can be calculated are given also. Nearly all of the figures in Tables I, II and III can be obtained in two

Table III Characteristics of Planetary Gear Classes

	1	2	3	4	5	6	7	8
	RPM Output	Variable RPM B	Torque Output	Torque A	Torque B	Power A	Power B	Total Power Through Gears
Non-regenerative Overdrive	+2000	+3000	50	+25	+25	25,000	75,000	100,000
Non-regenerative Overdrive	+1500	+2000	66.6	+33.3	+33.3	66,666	33,333	100,000
Non-regenerative	+1000	+1000	100	+50	+50	5,000	50,000	1000
Non-regenerative	+800	+600	125	+62.5	+62.5	62,500	37,500	1000
Non-regenerative	+600	+200	166.6	+83.3	+83.3	83,300	16,660	1000
Mechanical Reduction	+500	0	200	+100	+100	100,000	0	100,000
Regenerative Forward	+400	-200	250	+125	+125	125,000	25,000	150,000
Regenerative Forward	+200	-600	500	+250	+250	250,000	150,000	400,000
Regenerative Forward	+100	-800	1000	+500	+500	500,000	400,000	900,000
Regenerative Reverse	-100	-1200	-1000	-500	-500	500,000	60,000	1,100,000
Regenerative Reverse	-300	-1600	-333	-166	-166	166,000	266,666	432,666
Regenerative Reverse	-750	-2500	-1333	-66.6	-66.6	66,000	165,000	231,000
Regenerative Reverse	-1000	-3000	-100	-50	-50	50,000	150,000	200,000
Regenerative Reverse	-1500	-4000	-66.6	-33.3	-33.3	33,300	132,000	166,000
Regenerative Reverse	-2500	-6000	-40	-20	-20	20,000	120,000	140,000

or more ways by these formulae.

Contrary to the above calculations, the maximum output torque increase at starting may be only slightly decreased by the non-regenerative two-path power flow, below that of the torque converter when directly connected. These gears cause the rotor to turn in the reverse direction at the start. The torque ratio (rotor torque to impeller torque) produced by the turbo unit is, in this way, somewhat increased during this starting interval.

In non-regenerative gearing with a fluid coupling or fluid flywheel, no hydraulic reactionary member is provided. Therefore, there is no hydraulic change of torque ratio. The torque output always equals the torque input, less small losses due to windage and bearing friction. In cases where two paths of power flow are employed, a portion of the power and torque will take the path through the sun gear and the other gears. Another portion will go via the fluid route. In this way the hydraulic units will be relieved of a portion of the power and torque that they would be called upon to transmit if a direct hydraulic hook-up were employed. Such a system is useful to reduce the size of the fluid coupling required. This two path arrangement shifts the efficiency curve to the right due to the fact that the hydraulic rotor does not turn as fast as the output shaft, but merely approaches the speed of the output shaft as the 1 to 1 speed ratio is approached. However, if other gears are used in the circuit between the fluid coupling and the two path differential gears, then the overall torque characteristics are changed by the two path hook-up.

Where a fluid fly wheel is used without differential gearing, the loads imposed on the output may be

(Turn to page 64, please)

Fruehauf Enters

Truck Body Field

All-Steel Models to Be Built in Three Sizes with Open or Closed Tops

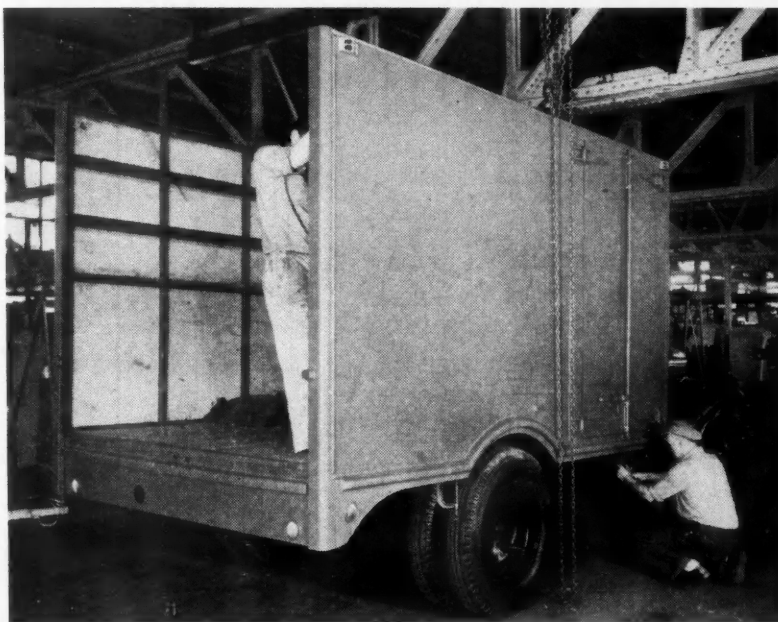
A NEW line of all-steel truck bodies, announced by the Fruehauf Trailer Co., are to be manufactured in three popular sizes—12, 14 and 16-ft lengths. Straight frame models are available in all three lengths, and a wheel-house model in the 12-foot size. Employing Fruehauf's Aerovan-type construction and standardized parts, they will be mass produced with many of the same production facilities used in volume manufacture of trailers. All-steel doors, for example, are standard Fruehauf welded trailer doors.

The bodies are available in either closed or open-top models, and combination side and rear door arrangements. With the options available, there are more than 500 basic combinations possible in the line. Side and rear door options include single side door; double side doors; without side doors; narrow double rear doors; full-width double rear doors; no rear doors; express-gate rear; tailgate rear and solid rear.

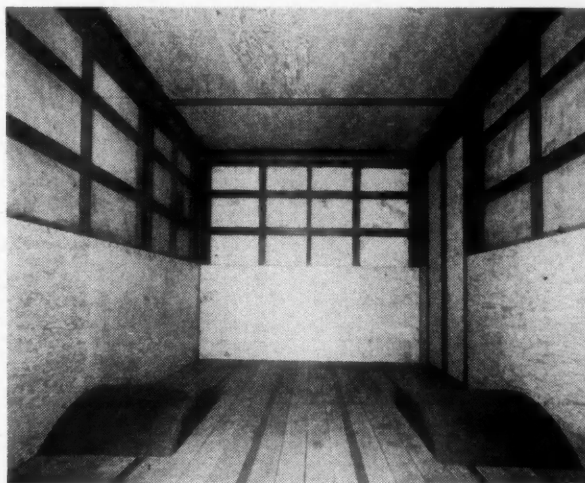
The steel roof of the closed bodies is virtually one solid sheet of metal. It is made up of sections of zinc-grip, galvanized roof materials which are joined by coin-pressed seams. These interlocking seams are dirt-, rust-, and weather-proof under all conditions, yet any section may be easily removed and replaced in the event of damage. Rectangular steel tubing is used for the framing. With this high-tensile steel alloy tubing, every structural part is a functional part. Steel rub-rails are pressed out as an integral part of the body to protect body sides and rear. Interior lining is of plywood, extending 3 feet from the floor with slats above and plywood lined roof.

The floor features high-tensile steel "hat" sections running the full length of the body and securely welded to sturdy die-formed steel crossmembers, with 11/16 in. flooring fitted between the steel sections.

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Body assembly of standardized sections nearing completion.



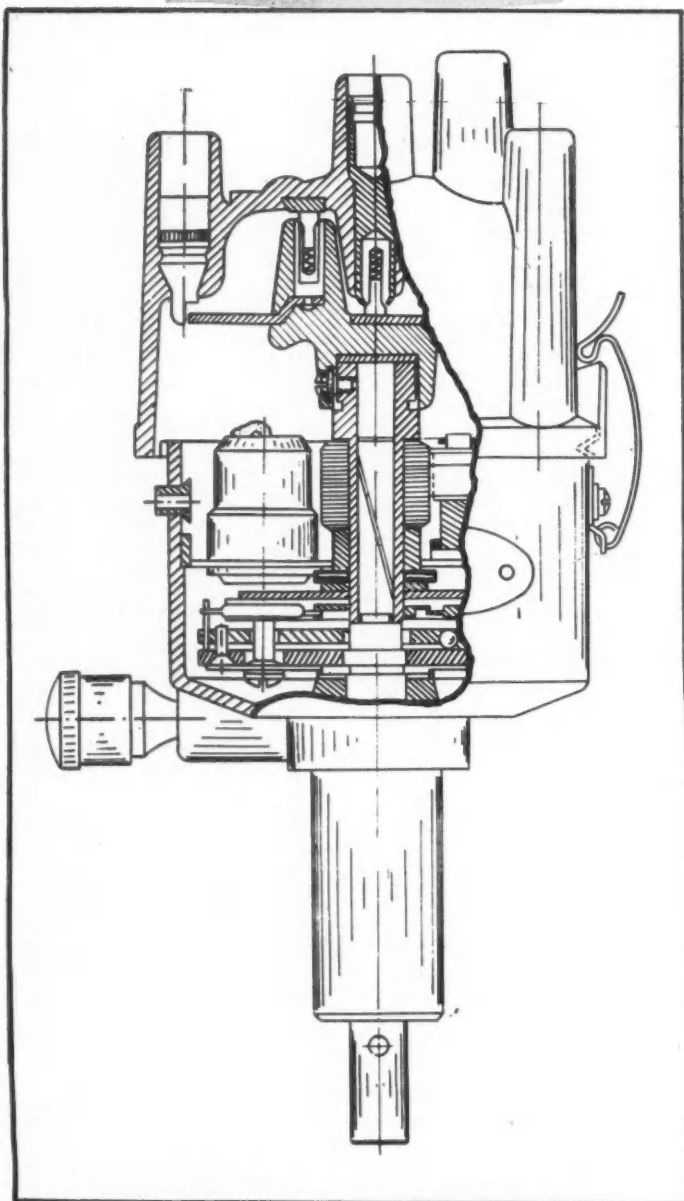
Interior view showing standard lining for new Fruehauf truck body of closed top type.

Diesel Ignition System

Provides High-Tension Spark of
Prolonged Duration for Diesel
Engines Using Heavy Fuel-Oil

By **Alfred J. Poole,**

Joint Intelligence Objectives Agency
Office of Military Government for Germany (U. S.)

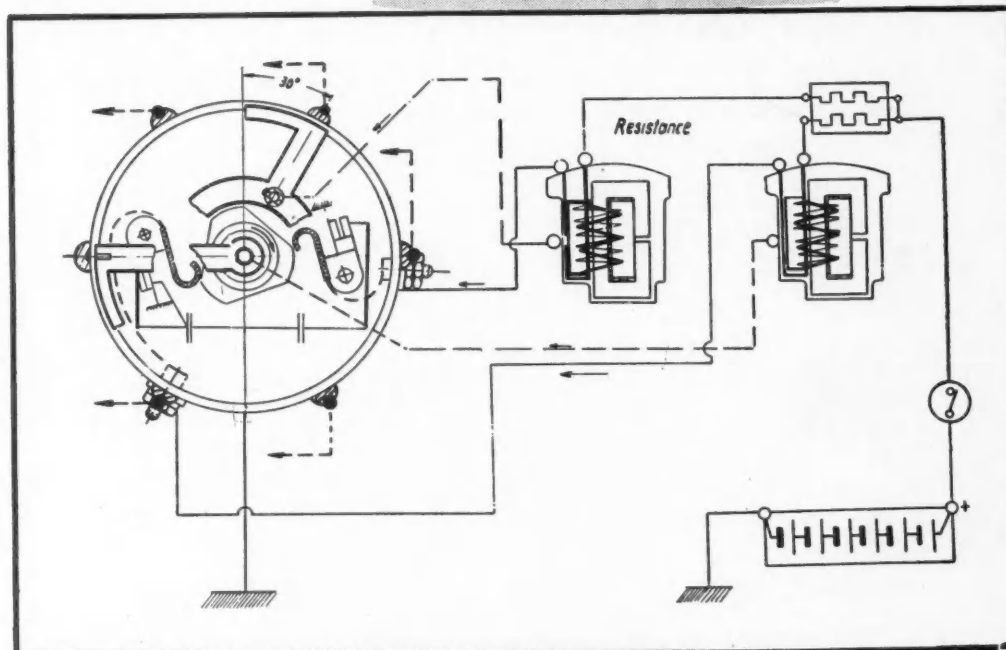


A BATTERY ignition system for Diesel engines operating on heavy fuel-oil was developed by the R. Bosch firm, Stuttgart, Germany, to meet a demand for equipment which would furnish a spark of good heat value and prolonged duration. The system consists of a 12 v battery, a timer with two contact breakers, and a special transformer coil. The timer, shown in Fig. 1, consists of a cast-iron housing having two tungsten-tipped contact breakers; two condensers having a capacity of 0.25 to 0.32 μ f; and a three-lobe cam. Below the plate supporting the breakers is an automatic advance device of standard design, with a 15 to 20 degree range measured on the distributor shaft. Its characteristics can be changed readily. Plain bearings only are used. The hard-rubber distributor cap has two high-tension cable inlets from the two coils, as well as six cable outlets to the spark plugs, this unit being for a six-cylinder engine.

Fig. 1—Sectional view of timer used with the Bosch-developed ignition system for Diesel engines operating on heavy fuel-oil.

m of New Design

Fig. 2—Shown here is the wiring diagram for the Bosch battery ignition system. A resistance of two ohms is placed in series with a 12 v battery and the primary of the coils. This system, particularly suited to an engine equipped with direct fuel-injection, is reported to have been used with highly satisfactory results by the Hesselman firm in Sweden.



The high-tension current from the coils is delivered to the distributor rotor through carbon brushes, one located in the cap, and the other carried by the rotor. Distribution of the current from the rotor to the electrodes is across a 0.02 in. gap in the usual manner. The two electrodes have an angular length of 30 degrees, as shown in Fig. 2. Each contact breaker takes care of three cylinders.

Due to the length of the contact breaker closing

(80 degrees for each cylinder), the two contact breakers and twin coil arrangement are used. The coils consist of a closed iron core with a 4 per cent silicon content; a primary winding of 265 to 275 turns of 0.0276 in. wire; and a secondary of 22,500 to 23,000 turns of 0.0047 in. wire. The coil housing is bakelite.

According to the manufacturer, this apparatus furnishes a high-tension spark of 30 degrees duration on the distributor, and operates satisfactorily at 3000 rpm.

New Hole and Shaft Standards

A new standard entitled Limits and Fits for Engineering and Manufacturing (B4.1-1947) has been developed by a technical division of the American Standards Association. This new standard is a partial revision of the Tentative American Standard on Tolerances, Allowances and Gages for Metal Fits approved in 1925. Its purpose is to serve as a guide to the machine designer in keeping to a minimum the various tools and gages required to produce and inspect cylindrical holes and shafts or other component parts with cylindrical surfaces.

In this new standard, a table of preferred basic sizes covers a range up to four in. inclusive, by as few as 46 diameters for holes and shafts. Also recom-

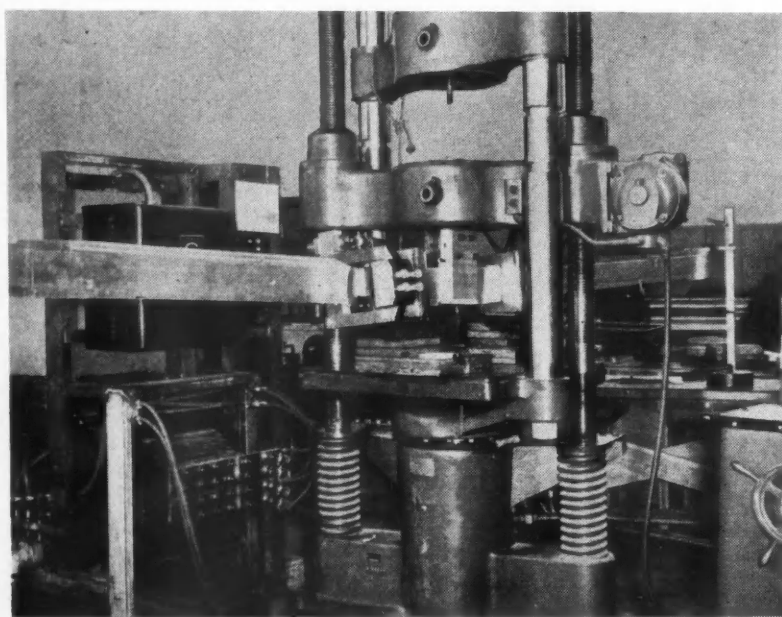
mended is the use of a series of preferred tolerances and allowances, to keep down the variety of limiting dimensions of component parts and hence the cost of manufacturing. The standard of 1925 was based exclusively on the basic hole system. The new standard, however, also recognizes the basic shaft system.

A series of definitions of terms applicable to a system of limits and fits are given in the new standard. These definitions have been agreed on by representatives of the American, British and Canadian national standards bodies. The new standard is intended primarily for application to fits between cylindrical parts, but may be used also for fits between parts of a different kind, such as a shaft key and the keyway.

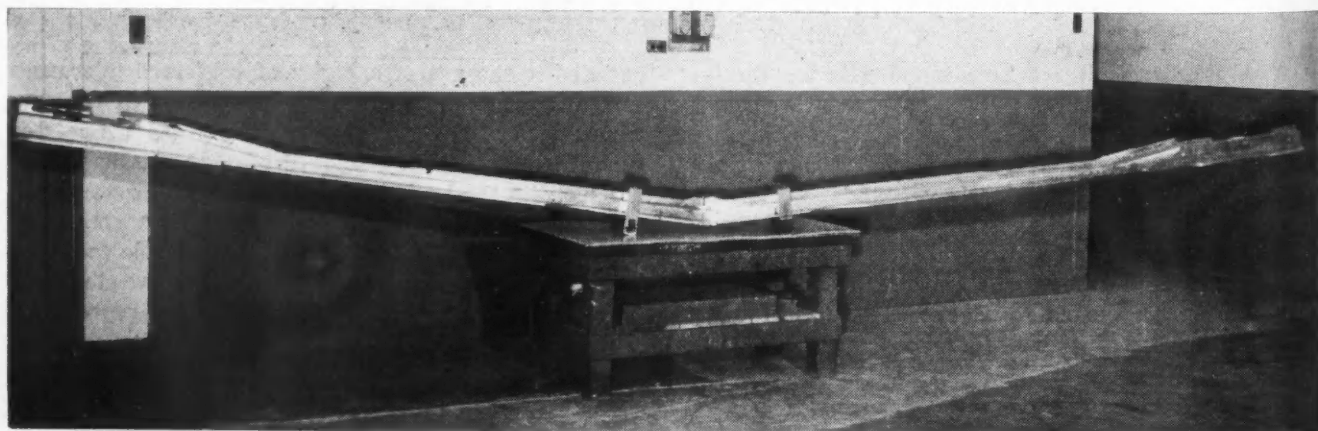
Severe Bending of 75S-T Spar Caps

By P. F. Girard

Physical Test Engineer,
Ryan Aeronautical Co.



Laboratory set-up in the Ryan Aeronautical Co. for bending spar cap of heavy Alcoa 75S-T aluminum alloy. Spar cap is heated by current from transformer and ignition panel while being bent for sweepback in hydraulic press.



Wing spar cap after bending for sweepback and dihedral.

RYAN Aeronautical Co., San Diego, has just completed the severe bending of spar caps made of the high strength 75S-T aluminum alloy. This work was accomplished in the Engineering Laboratory on an experimental basis for a jet-plus-propeller Navy fighter. Cross-sectional area of this structural part was seven sq in.; it was severely bent up to give the wing dihedral, and bent back to provide sweepback.

This new 75ST aluminum alloy is very difficult to bend without fracture in the heat-treated condition, and is quite notch-sensitive. It can be formed more easily in the W condition, or immediately after heat-treating, but this desirable condition exists for a short time only. In production, it would not be possible to perform the bending within the time necessary after heat-treating to take advantage of this transient stage. Most large spar caps have been built up with laminated sections of 14S-T aluminum alloy which is much simpler to form in the T condition.

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How Strong Is Our Air Force Today?

By Robert McLarren

AUGUST 1, 1947 commemorates the 39th anniversary of the founding of the Army Air Forces and almost the end of two years following a victory it, more than any other branch of any other service, helped make possible. Because that war was won, it was inevitable that the machine created to do the job has been dismantled. Comparisons of the present size of the AAF with its Spring, 1945 size are, of course, meaningless as are comparisons of its current and 1939 status. The sole criterion for the size of the Air Forces is the size of that force or forces that could be brought against it. On that basis the Army Air Forces—1947 represent a potent mobile striking and defense force thoroughly capable of defending the continental United States from enemy air aggression.

For air defense, the AAF has the following in a state of readiness: the 1st Jet Fighter Group of Lockheed P-80 types at March Field, Calif., the 56 Fighter Group of North American P-51 types at Detroit, Mich., and the 20th Fighter Group, made up of two squadrons of P-51s and the 415th Night Fighter Squadron of Northrop P-61s, located at Shaw Field, S. C. For air attack, the AAF has the 47th Bombardment Group of Douglas A-26 types at El Paso, Texas and the 477th Composite Group of Republic P-47 fighters and North American B-25 bombers at Lockbourne, Ohio. For long-range bombardment, the AAF has the 7th Bombardment Group at Fort Worth, Texas, the 97th Bombardment Group at Salina, Kansas, the 43rd Bombardment Group at Tucson, Arizona, the 509th Bombardment Group at Roswell, New Mexico and the 307th Bombardment Group at Tampa, Florida, all equipped with the Boeing B-29, which is still unrivaled by any potentially unfriendly air force. A roughly equivalent force is on duty overseas, available on short notice for return home.

While this simple listing of the available AAF combat units indicates a comparatively small force, few citizens realize the remarkable degree of readiness inherent in these units. The 1947 AAF is no "peacetime" air force. Its officers, its pilots, its aircrews and groundcrews are on a full wartime status in every sense of the term. A recent tour of typical installations revealed a vigorous chain of command from General Spaatz to messcooks tightly integrated into a well-knit team. Nor is this "readiness" a multi-

fying "availability." Unpredicted "alerts" are sounded from Strategic Command headquarters at Andrews Field, Md., and within four to six hours an entire bombardment group is winging its way in full battle array to Alaska, Maine, or South America. Another bombardment group 1,000 miles away is simultaneously ordered to the base of the first for support.

Overseas units of the AAF are constantly changed, as often as once a month in many cases. These transfers require spanning the Atlantic to Germany or the Pacific to Tokyo on very short notice. These long-distance movements keep navigational, group maneuvers, supply, control and maintenance capabilities in a constant state of readiness, the real backbone of air power. By 1945 standards we have only a skeleton air force in size. But by those same standards of training, teamwork and striking power, we have a full-fledged 1947 Army Air Forces capable of discharging its obligations to the nation.

The aircraft manufacturing industry on which the AAF depends for its material strength has also undergone a streamlining and a thinning out by 1945 standards. But it, too, exhibits a surprising state of readiness for the delivery of new, improved types in quantity to the AAF. In most cases, the industry is being sustained in a balanced condition through interim production contracts. Among those aircraft now in quantity production for the AAF are: North American B-45 jet propelled bomber; Lockheed P-80 jet propelled fighter; Republic P-84 jet propelled fighter; Boeing B-50 strategic bomber; Consolidated Vultee B-36 strategic bomber; Northrop B-35 and B-49 strategic bombers.

These, lacking only Curtiss, Bell, Douglas, and Martin, are the major World War II producers of AAF combat aircraft and comprise the essential nucleus specified for the maintenance of combat aircraft productive capacity. Curtiss, Douglas and Martin are engaged in Navy and commercial production comprising an equal degree of "know how" preservation and strengthening. Bell, in addition to numerous others, is pioneering in the tactical helicopter field under AAF contract and thereby creating a new productive potential. Thus, two years after V-J Day, the aircraft industry, like the AAF itself, has been substantially

(Turn to page 78, please)

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

E-26—New Series of Clearing Presses

The new Series "S" presses, recently added to the line of Clearing Machine Corp., Chicago 1, Ill., are considerably smaller than those heretofore manufactured by this company. This new line of straight-sided presses incorporates numerous departures from previous designs and will be built in capacities ranging from 60 tons to 250 tons.

The Series "S" Presses have been



Clearing Series "S" press

designed to provide a line of standard machines which can be quickly made available for delivery in an extremely wide range of specifications. The frames are all welded steel, which permits a variety of dimension without seriously affecting the price. Bed widths, right to left, are offered ranging from 36 in. to 108 in. in increments of six in. and 12 in., and any of these sizes may be had with bed depths, front to back, ranging from 8 in. to 44 in. Stroke lengths may vary from as little as three in. or four in. to as long as 16 in. to 18 in. and shut heights similarly are available over a large range, or specifications to suit customers' requirements.

Slide adjustment is of the barrel type in which the screw is not subject to bending because it is supported top and bottom in a cylinder or barrel. The adjustment of the two separate connecting screws are geared together to maintain uniformity of adjustment. The ad-

justing mechanism can be operated by hand, or by electric motor. In power adjustment, the motor is provided with a magnetic brake, which automatically unlocks or locks the adjustment drive. The slide adjustment is also provided with limit switches to prevent over adjustment.

The "S" Type presses are of the double crank type, with twin end drive, all gears are of steel cut from solid, running in oil. Most of these sizes can be furnished either single or double geared.

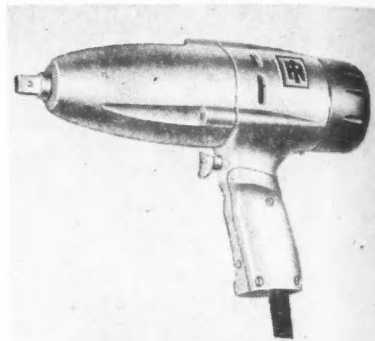
A feature for a press of this type is an air friction clutch interlocked with a spring actuated brake. The unit is electrically operated from one or more push button stations located conveniently for the operators. These presses are also equipped with air counterbalance cylinders and machined to receive standard air cushions.

E-27—All-Purpose Impact Tool

A universal, electric, all-purpose impact tool has just been introduced by Ingersoll-Rand Co., 11 Broadway, New York, N. Y. Using standard attachments, it will apply and remove nuts, drill, ream, tap, drive and remove screws, drive and remove studs; extract broken cap screws and studs, run wire brushes, do hole saw work, drill

brick and masonry, and drive wood augers.

This new machine is designated as Size 4U. It weighs only 6½ lb, has an over-all length of 10½ in., a free speed



Ingersoll-Rand electric impact tool

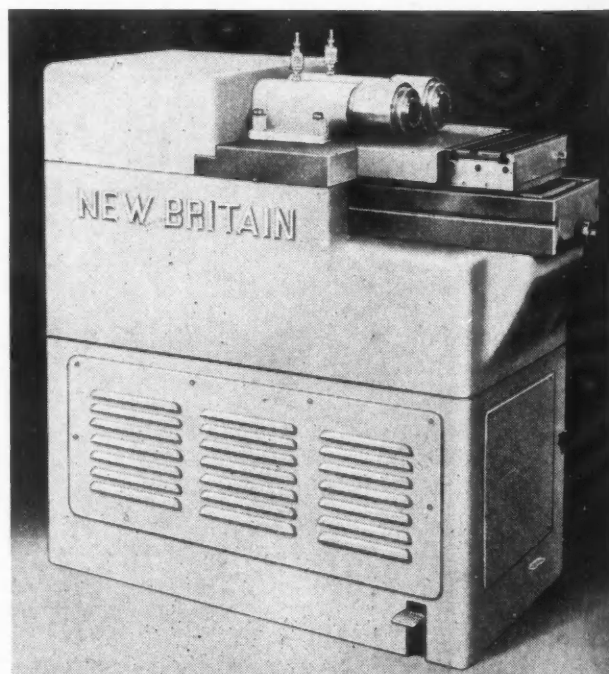
of 2000 rpm, and delivers 1900 rotary impacts per minute under load. It is powered with a specially designed reversible, universal, electric motor (3 amp) that operates on 110 volts.

The impact tool runs just as any conventional electric tool until the resistance to spindle rotation reaches a certain amount. Then a mechanism converts the power of the motor into "rotary impacts" which exert a more powerful turning effect.

E-28—Contour Boring And Turning Machine

A new contour boring and turning machine to perform precise second operation work has been developed by New Britain-Gridley Machine Division, the New Britain Machine Co., New Britain, Conn.

In addition to the regular jobs of



New Britain contour boring and turning machine

straight boring and turning, facing and chamfering, the compound action obtained from contours on the two cams directs the single point tool in producing lands, steps, recesses, flanges, counterbores and radii. This tool is fed free to the bottom of the bore and cuts on the drawback stroke.

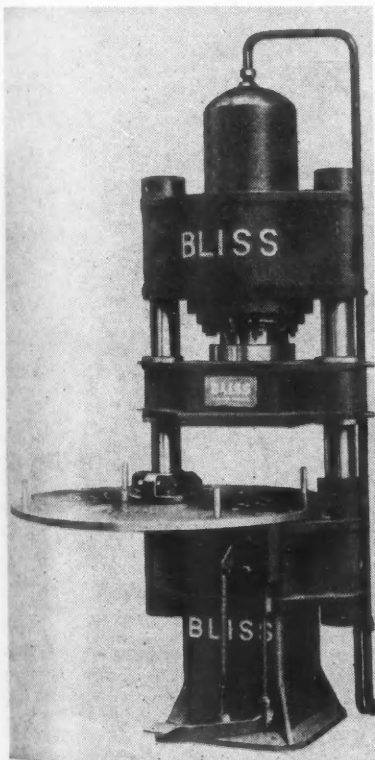
For jobs too complicated for a single point tool, a tool cluster may be arranged. Either work or tool may be held in the spindle to adapt it to a wide variety of work. The machine is said to be so accurate that only one dimension of its work need be inspected. If the cams are correct, variations on other dimensions cut by the same tool are impossible.

The machine is cam and air actuated, and fully equipped with safety devices to prevent injury to the operator or damage to the machine. Two different sized models are made and spindle speed up to 6000 rpm are available.

E-29—Press for Moulding of Ceramics

E. W. Bliss Co., Detroit 2, Mich., announces a new hydraulic press, specifically designed for compression moulding of ceramics. Of two-rod, down-moving type, the tile press is built in two standard sizes of 75 and 150 tons, and is regularly equipped with a four-station, manually operated dial feed to facilitate loading and unloading of the moulds.

The use of the dial provides for multiple operations. While one mould is being pressed in the press, another mould



Bliss press designed for compression moulding of ceramics

New Production and Plant

EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

can be filled at the loading station while the previously pressed mould is being removed at the unloading station. Several operators can thus be utilized.

Press control is by hand lever with three positions: "down," "neutral," and "up." When the lever is depressed, the slide closes rapidly, and automatically slows to pressing speed upon contact with the work. Pressure is built up and maintained until the control lever is again moved. At "neutral," the slide loses pressure, but remains stationary; at "up," the slide ascends at quick-reverse speed to top-stroke position, or until "neutral" or "down" control stations are resumed. Pressure is adjustable and uniform throughout a 14-in. stroke. An oil cooler is provided to maintain the most suitable temperature range for the equipment. Floor space is approximately 74 in. by 91 in. and the overall height about 9½ ft.

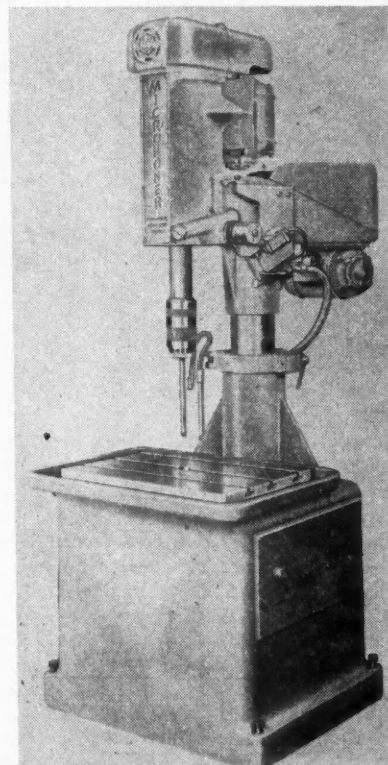
E-30—Utility Microhoning Equipment

The Micromatic Hone Corp., Detroit, Mich., has brought out a new line of Microhoning machines and tools. This equipment—the Microhoner machine and Micromold utility tools—is designed for general tool room use, semi-production, and salvage or reconditioning work.

The Microhoner Model No. 717 is an all-mechanical machine. The stroke, reciprocation and rotation speed and head to table distance are all adjustable so the one machine may be used to Microhone a range of bore diameters from ½ to four in.

Tool expansion is controlled by rotating an adjusting sleeve. This sleeve is on the spindle, but does not rotate with it. The operator may expand or collapse the tool, at any time, at a controlled rate. There is a lift-out stroke of 3½ in. in addition to the six in. working stroke. The head is counterbalanced, and the starters for the rotation and reciprocation motors are interlocked with the lift-out arm. The operator has only to shift the lift-out arm to stop, start, or "inch" the spindle rotation and reciprocation.

The Micromold utility tools are designed to cover a wide range of types and sizes of bores. Five tools will cover a range of bore diameters from one in. to four in. The Micromold sticks used in these tools have the abrasives encased in plastic stone holders. This eliminates the need for steel stone holders, shells and expanders. When the



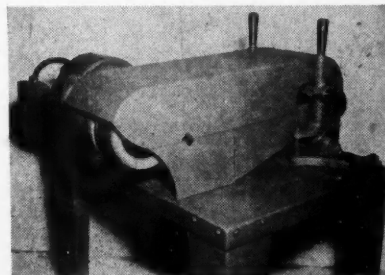
Microhoner machine Model No. 717

abrasive is used up, the entire Micromold abrasive unit is discarded and a new set of sticks is inserted. The plastic case about the abrasive also controls the breakdown of the abrasive so more efficient cutting action is obtained.

E-31—Double Belt Bench Grinder

The Porter-Cable Machine Co., Syracuse, N. Y., has made a new addition to its line of precision abrasive belt grinders—the new model DBS double belt bench grinder.

A heavy duty drive shaft mounts two



Porter-Cable Model DBS double belt bench grinder

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

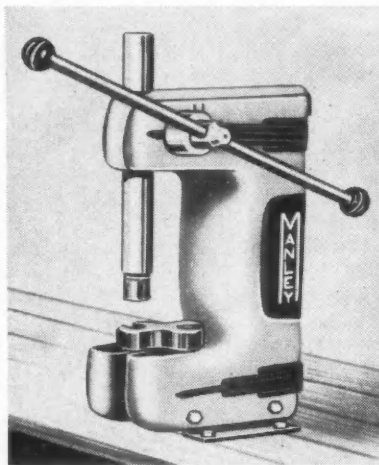
seven in. diameter by 2½ in. wide resilient contact rolls located side by side and only inches apart. Each contact roll is aligned with an idler adjustable for abrasive belt tension, tracking and lining up with the contact roll. This set up provides for the use of two endless metal cutting abrasive belts 2½ in. wide by 60 in. circumference. The result is a two station grinder. One station can be fitted with a coarse abrasive belt for rough grinding, the other with a fine grit belt for finishing.

The resilient roll receives little wear. All work is done by the sharp cutting abrasive grains almost entirely exposed, with no binder or filler to interfere with its full cutting capacity. Abrasive belt change when required is accomplished in a few seconds.

The DBS equipped with a 1-hp motor gives the abrasive belt a cutting speed of 5200 fpm. A dust guard designed so that dust follows naturally to an outlet in the rear of the unit is furnished as standard equipment. Accessory items available include an eight-in. diameter contact roll, 29 in. high or 12 in. low leg assemblies, and a wire brush attachment.

E-32—Three New Manley Presses

Three new arbor presses have recently been placed on the market by the Manley Manufacturing Division of American Chain & Cable Co., Inc., York, Pa. These presses are built to handle jobs up to three tons. They are easy-to-operate, mechanical presses. Each of these is made of a one-piece, C-type



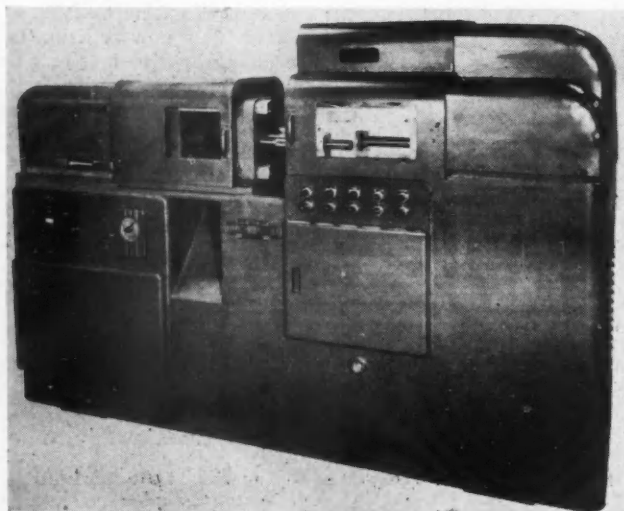
Manley APB-3 arbor press

casting. On all of these presses an adjustable handle with a positioning groove permits the rack to be spun down to the work.

There are three types of Manley arbor presses. While these presses are similar in design they differ in weight and construction. The AP-3 weighing 130 lb is designed for column or wall mounting; the APB-3 which weighs 135 lb is adaptable for bench use; and the APWS-3 weighs 190 lb and comes complete with stand.

E-33—Injection Molding Machine

The Fellows-Leominster 1B-2 plastics injection molding machine, built by the Plastics Division of The Fellows Gear Shaper Co. of Springfield, Vt.,



Fellows-Leominster 1B-2 plastics injection molding machine

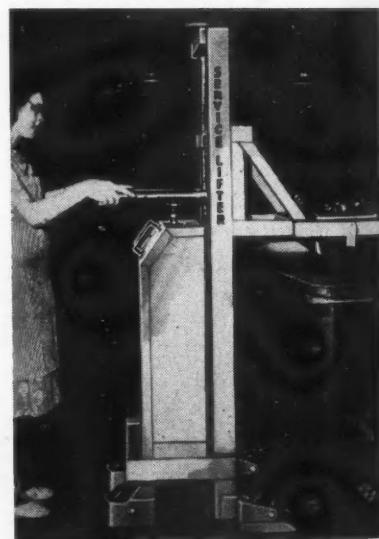
incorporates several new design features. The molding capacity is two oz per shot, at a speed up to six shots per minute, depending on the product and the design of the mold. The casting area is 30 in., stroke five in., and platen area ample for molds up to 10½ by 13½ in. or a No. 2 D.M.E. standard mold base.

All hydraulic, electric and water-cooling controls are within easy reach of the operator for both set-up and automatic operation. Speed and pressure of injection, as well as speed of mold closing are controlled. Time controls are adjustable to the second by an Eagle Signal Microflex control which provides for independent control of the injection plunger, mold closing and mold opening time.

The temperature controller is the Leeds and Northrup Electromax. Since this instrument has no moving parts and is vibration proof, it is possible to locate it in the machine base. The machine thus becomes a complete unit, thereby eliminating the separate mounting of pyrometers and the running of leads from the machine to remote panels. The only connections required at the machine are the main power leads, water and drain connections.

A 1000 psi Vickers hydraulic system is provided. All valves are mounted on a sub-panel located in the back of the machine and are accessible by removing a sheet metal guard.

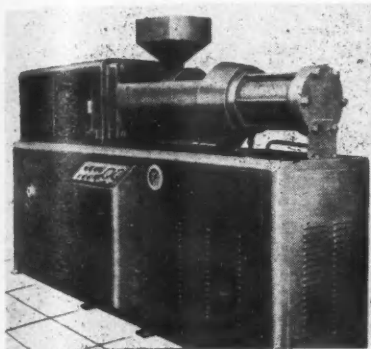
E-34—Tote Pan Lifter



Speedy, safe and easy handling of tote pans is said to be accomplished with this storage-battery-operated Tote Pan Lifter made by the Service Caster & Truck Corp., Albion, Mich. Controlled by a push button on the handle, and powered with two standard six volt batteries, the Lifter has a capacity of 150 lb. Overall height is five ft, nine in. Lifting height is 54 in. Protection of the operator's feet is provided by safety hoods mounted on the Lifter's Forgeweld swivel caster running gear.

E-35—Plastic Injection Machine

Hydraulic Machinery, Inc., Dearborn, Mich., is introducing a new Hy-Mac plastic injection machine, the Model 1M-3. Among its features are: Two electronic temperature controls that regulate heat in the chamber and nozzle with accuracy of plus or minus two deg; mold clamping by toggle action which insures alignment in closed



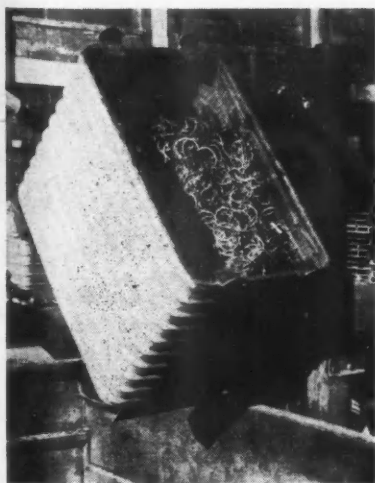
Model 1M-3 plastic injection machine

position; and platens designed for maximum strength and minimum weight.

A clearance of 12¼ in. is provided between strain bars at top and sides. Platens are adjustable to hold dies of 5½ in. to 12 in. Maximum pressure of the injection plunger is 20,914 psi when operating at 1000 psi. Pressures may be reduced to zero. The injection stroke has a five-sec cycle for full eight in., traveling at 100 ipm. Two timers installed in the panel control injection piston and mold clamping time.

E-36—Attachment for Lift Trucks

Tote boxes filled with scrap or refuse for dumping, and many similar lift truck loads, now can be unloaded di-



Fork-rotating attachment for Clark lift trucks

New Production EQUIPMENT and Plant

For additional information regarding any of these items, please use coupon on page 56

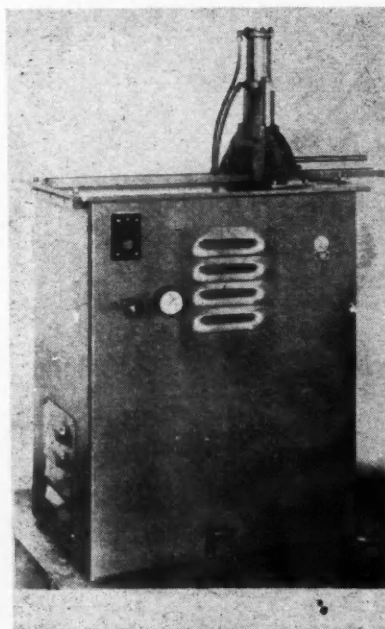
rectly with no intermediate handling. This is made possible by a new device recently added to the line of Clark Tructractor, which rotates the truck's entire fork assembly.

Operated by hydraulic motor and gear reduction, the rotating mechanism is adaptable to fixed or adjustable forks, scoop and other special attachments.

Savings of time and manpower claimed for the device are accomplished by elimination of manual operations necessary with non-rotating forks—removing a container in order to dump its contents, then replacing it on the forks.

This device is a product of Clark Tructractor, Division of Clark Equipment Co., Battle Creek, Mich.

E-37—Abrasive Cut-off Machine



This hydraulically-controlled abrasive cut-off machine is a recent development of the George H. Bullard Co., Inc., Westboro, Mass. Hold-down clamps are hydraulically actuated, and the upward-operating wheel is controlled through a hydraulic system.

E-38—Assembly Press

Expansion of its line of standard hydraulically operated assembly presses to include a 10-ton model has been re-

vealed by Colonial Broach Co., Harper Station, Detroit 13, Mich. With a maximum adjustable stroke of 12 in., the press has a power stroke speed of 180 ipm with a return stroke of twice that amount. Ram speeds are adjustable over a wide range, however. Working pressure is 1200 psi, maximum, and is adjustable through a knurled dial on the front of the machine to any desired amount below this. This feature is said to be particularly advantageous when assembling relatively delicate parts. Desired pressure can be selected and maintained exactly through a direct-reading pressure gage adjacent to the pressure control regulator. The machine requires 25 by 42 in. of floor space and is operated through a 7½ hp motor.

Standard equipment on the 10-ton model includes hand operating control and pressure gage. Foot pedal control, for use where operators are required to have both hands free, is available as extra equipment, as are various pressure and speed controls to suit individual needs.

E-39—Rotary Work Table

A five-in. diameter rotary work table for engraving, profiling, graduating, milling, and drilling on any object requiring circular or semi-circular cutting, is offered by H. P. Preis Engraving Machine Co., 157 Summit St., Newark 4, N. J. Although designed primarily for use on the Preis pantographic engravers, its compactness and



Preis rotary work table

low build make it adaptable to virtually any engraving machines. It can be used also on small-production milling and drilling machines where, it is claimed, layout work can be greatly reduced on many types of jobs.

NEW Products

For additional information regarding any of these items, please use coupon on page 56

F-20—New Set of Matched Tool Steels

To give tool and die makers greater simplification in the selection, heat treatment and use of tool steels, a new and improved set of matched tool steels has been developed by the Carpenter Steel Co., 303 W. Bern St., Reading, Pa.

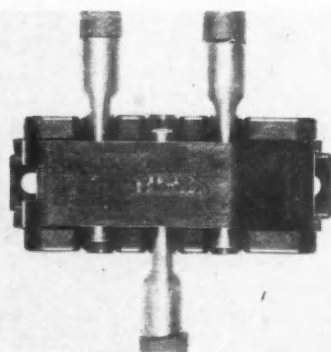
Three air hardening steels have been added to the matched set. Where extreme wear resistance and good toughness are needed, No. 610 is recommended by the maker. For jobs where an ideal combination of wear resistance and toughness is essential, tool makers can use No. 484 (Air-Hard). VEGA (Air-Tough) is used for tools that require extreme toughness with good wear resistance.

Two new tool steels have been placed in the Red-Hard matched set. T-K (Red-Hard) combines greater hardness with improved toughness, insuring more universal application. And because No. 883 (Red-Tough) offers extreme toughness and greater red hardness, it can be applied to a wider field of uses.

F-21—Junction Box For Battery Terminals

The Bendix-Scintilla Bus-K-Nect has been specially designed by the Scintilla Magneto Division of Bendix Aviation Corp., Sidney, N. Y., as a time-saver in the removal and replacement of batteries for buses, trucks or other heavy-duty motor vehicles requiring frequent battery changes. It may be used in both single-battery and dual-battery installations.

The Bus-K-Nect consists of a moulded junction box of high impact material accommodating three terminals in a



Bendix Scintilla Bus-K-Nect

compact arrangement, complete with hinged cover which affords additional protection to the connections. It is about 4½ in. long, 2 in. wide and 1¾ in. high.

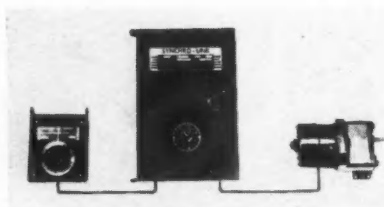
Cable terminals fit securely in the spring contacts. Terminals are furnished in three different sizes, with cable holes ⅜ in., 7/16 in. or ½ in. in diameter. This permits the user to choose a size to fit the cable best adapted to his own purposes.

Assembly of the cable to the terminal is accomplished by stripping cable insulation back to a point allowing sufficient room for soldering or swaging the terminal onto the stripped portion of the cable.

The Bus-K-Nect may be conveniently mounted on the vehicle frame. For best results a plain washer should be placed between the bolt or screw head and the finished surface of the connector, thus protecting the moulded material from direct pressure exerted by the fasteners.

F-22—Servo Control

The Synchro-Link, Type SL3, is the latest product of Yardeny Laboratories, Inc., 105 Chambers St., New York, N. Y. This remote positioning servo



Synchro Link Type SL3

control will quickly position one or several distant motors according to the setting of a master dial. Its accuracy is independent of the load.

The device operates on the principle of a self-balancing electronic bridge. It consists of three basic elements. The master control with a knob and a calibrated dial for manual control or with a ¼-in. shaft extension for automatic control; the Synchro-Link electronic controller; and the load control potentiometer geared to the motor or coupled to the load.

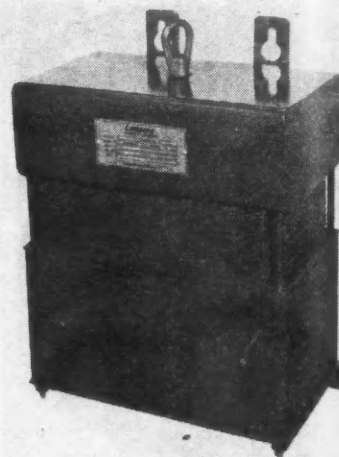
The synchro-Link, Type SL3, can be used for a variety of remote positioning operations. It will control the speed adjustment on variable speed transmissions, the setting of motorized valves, volume dampers, engine throttles,

pumps, machine tools, special machinery, etc. The controller contacts will handle up to 15 amp, 110V, ac, non-inductive load, and up to 10 amp, 220V ac, non-inductive load.

F-23—Power and Lighting Transformers

The Transformer Division of Lindberg Engineering Co., 2444 W. Hubbard St., Chicago 12, Ill., is now manufacturing a complete line of power and lighting transformers in sizes from 1 kva to 100 kva.

The transformers, rated from 1 to 15



Lindberg 3 kva transformer

kva, are totally enclosed for outdoor and indoor use. Transformers of standard rating are made to operate at rated frequency, and on any of the rated voltages up to 600 volts.

All transformers include a wiring compartment. This compartment is manufactured with knockouts to facilitate any conduit arrangement.

F-24—Geon Polyblend

A new product said to offer properties never before available in a thermoplastic material is now in commercial production by B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland, Ohio. Designated Geon polyblend 500 x 503, this development is the first in a series of colloidal blends of Geon polyvinyl chloride resin and Hycar nitrile rubber polymers.

Geon polyblend combines the toughness and chemical resistance of polyvinyl chloride with the solvent resistance and flexibility of nitrile rubber. It is also unique in that the characteristics of vinyl elastomers are achieved with no liquid plasticizer. The nitrile component of the polyblend serves as a non-extractable, non-migrating, polymeric plasticizer. If desired, conventional liquid plasticizers may also be added.

Geon polyblend has been especially



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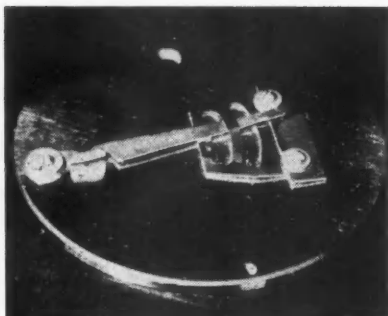
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designed for extruding and calendering and is well adapted to embossing and press-polishing operations. In the electrical industry, polyblend will serve as an excellent covering for cables containing vinyl insulated wires since there is no danger of plasticizer migration.

F-25—Recording Strain Gage

The deForest scratch recording strain gage, which became unavailable during the war, has again been made available by the Baldwin Locomotive Works, Philadelphia, Pa. Formerly acting as exclusive sales agent for Dr.



deForest scratch recording strain gage arranged to measure bending strains in disk

A. V. deForest, the inventor, under whose direction the device was formerly made, Baldwin has now acquired control and is manufacturing the gage.

The instrument is self-contained, weighs less than two grams, and records deformations of 0.0001 to 0.050 in. by a scratch pattern on a small polished chrome plated target. Its principal applications have been the measurement of strains in fast moving machine parts, as, for example, airplane propellers and engine crankshafts, but it is also used to some extent in stationary structural members.

The scratch record is made by a special abrasive coating on the end of a two-in. arm which is held on the target. The gage may be fastened to a structural member under test by such means as screws, solder, spot welds and clamps. Attachment is made with the scratch arm parallel to the direction of strain. Deformation of the member causes longitudinal movements of the scratch arm and target relative to each other while the arm gradually sweeps across the target. Although the gage does not measure torsional strain quantitatively it indicates its presence

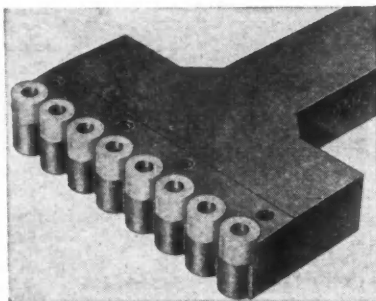
and frequency in terms of longitudinal vibration.

The gage is mounted with the scratch arm centered on the target. When ready to test, the arm is pushed to one side or the other of the target, thus marking zero lines across which the scratch records are made, and setting up a restoring force in a fulcrum spring in the arm. One part of the target presses down on the arm with sufficient force to hold it in place when the test surface is static but permits creeping toward center when deformation of the member causes longitudinal movements in the gage. The rate of this movement can be adjusted to make closely packed or spread out records. Two records can be made on each target, and by using removable half-targets, several records may be made before removing the gage.

The scratch record may be examined and measured under a filar eye-piece microscope of about 100 to 250 magnification or photographs of up to 1,500X may be made.

F-26—Tool for Turning Iron Rolls

A new roughing roll-turner tool for production and redressing of chilled cast iron rolls of any Scleroscope hardness rating has been added to the line of Kennametal, Inc., Latrobe, Pa. This tool comprises a series of replaceable sharp-edged solid Kennametal cemented carbide discs secured to a heat-treated shank with countersunk cap



Kennametal Style RRT roughing roll-turner tool

screws and backed up by a hardened steel plate.

The first cut with it turns a series of circular grooves with rough humps between. The tool is then repositioned, and a second cut removes the humps, leaving a "scalloped" surface which is

smoothed out with a block type of finishing tool, also made by Kennametal, Inc.

The operating advantages of this new tool are said to include: Easier cutting through scale; faster roll-turning speeds; more metal can be removed per cut; quicker turning up of roll; less stock to be removed by the finishing tool.

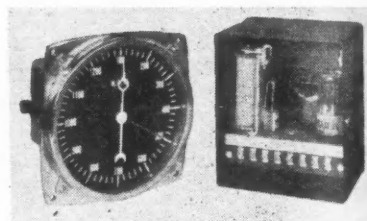
When the cutting discs become dull, they can be rotated to a new cutting position—several cuts can be made before the discs need to be resharpened. Sharpening of the discs is simple since only the tops need to be smoothed up. A disc that has been accidentally damaged can be quickly replaced with a new one.

Kennametal roughing tool turners, designated Style RRT, are now available in 4 in., 6 in., 8 in. and 10 in. widths.

F-27—New Tachometer

Jones Motrola Corp., Stamford, Conn., offers a new tachometer with electronic control that can be used as a safety or control device.

The tachometer is of the centrifugal type. Stray electrical currents or close proximity of large electrical units do



Jones tachometer and electronic control

not affect the readings. Likewise, extreme temperature changes do not interfere with its operation. Instruments can be supplied with indicating dial in any terminology desired.

The electronic control operates on a tiny current flow of only 3/1,000,000 amp. This small current is then amplified more than a thousand times to energize a relay that accomplishes the required task.

By setting the red indicator hand, the maximum speed of the equipment can be controlled. When the predetermined speed is attained, the electronic device actuates a relay that will shut off the equipment, ring a bell, flash a light, or any other operation that is required.

F-28—Industrial Relief Valve

A new relief valve specially designed for industrial uses with mineral oil systems has been brought out by Electrol, Inc., Kingston, N. Y. This relief valve can be adapted to use with water in special cases.

The new Electrol relief valve fea-

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UNMATCHED ECONOMY The new Warner Electric Brakes are inexpensive to install. Use only as much current as a tail light. Require minimum servicing thus preventing costly delays and tie-ups of equipment.

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GREATER SAFETY When both the tractor and trailer are equipped with Warner Electric Brakes their *instantaneous* "stopping power" under *absolute control* assures greater safety. All brakes "come in" at the same instant, but with varying *amounts* of power. Therefore, rear trailer wheels get the *effect* of coming in first — and the tendency to skid or jackknife is prevented, thus giving greater protection to the driver and load — and avoiding costly repairs or tie-up of equipment.

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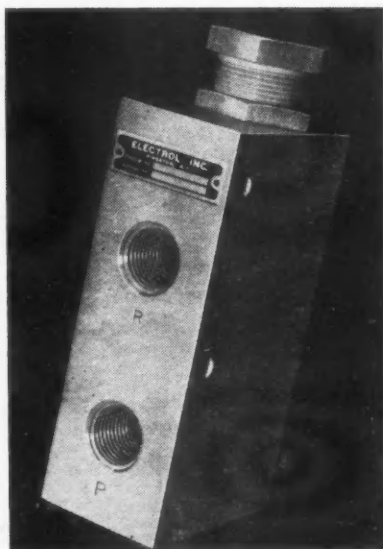
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tures a dampening device consisting of a close fitted piston working in oil, which is said to prevent squealing or chattering. Furthermore, the range between cracking pressure and full flow can be kept very small, with cracking pressure reaching 90 per cent of full flow pressure. Likewise, the spread between full flow and re-seating pressure can be kept small, with re-seating pressure reaching as high as 85 per cent of full flow pressure. Closing time from full flow to complete shut-off is exceptionally small.

This value is available in two models. Model 523-8 measures 5 in. by 2 in. by 1 3/8 in. Both ports are in the same plane and are 3/8-18 N.P.T. ports. Its range is from 500 to 2100 psi; its maximum flow is 6 gpm. There are two mounting holes in the same plane for 3/16-in. bolts.

Model 523-14 measures 8 1/2 in. by 2 3/8 in. by 3 1/4 in. Both ports are 3/4-14



Electrol relief valve

N.P.T. Its pressure range also is from 500 to 2100 psi; its maximum flow is 16 gpm. The two mounting holes for 3/8 in. bolts are in the same plane.

F-29—Two New H-VW-M Products

A new stop-off lacquer "Kote-Masq," has been introduced by the Hanson-Van Winkle-Munning Co., Matawan, N. J.

A feature of this new product is its ability to provide positive adhesion at the edges. Kote-Masq is recommended

by the manufacturer for use in any electroplating, electrocleaning, or anodizing solution. It can be applied by dipping, brushing, or spraying. It should be stored in the original shipping container or one of glass; not plain tinned or galvanized containers.

Kote-Masq consists of three separate materials: Kote-Masq—the actual stop-off lacquer, in the traditional orange color; Kote-Thinner—used to dilute the lacquer, if it should thicken before use; and Kote-Thinner, Grade S, which must be used when spraying, but for no other purpose.

Kote-Masq can be removed with a chlorinated solvent liquid or in a vapor degreaser.

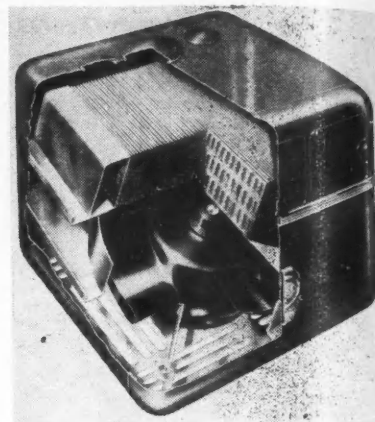
The company has also developed Chrome Spray Floats for use in chromium plating tanks. These floats are laid on the solution to a thickness of about one in., forming a blanket which cuts escaping spray to a minimum. Also, the floats help to keep the heat inside the tank, thus conserving the supply of chromic acid. H-VW-M Chrome Spray Floats are, moreover, an effective auxiliary to ventilating systems.

The floats are yellow, polystyrene tubes, 2 3/4 in. long, completely enclosed and will float on the surface of the solution. Approximately 1/2 lb per sq ft of solution surface area are required. They are practically indestructible and can be used indefinitely. They do not adhere to or interfere with the work in the tank.

F-30—Super-Deluxe Heater-Defroster

Completion of engineering and release to production of a Super-Deluxe heater-defroster for both passenger cars and truck cabs is announced by Thermo-Aire Division, Evans Products Co., Plymouth, Mich. The new addition to the Evans vehicle heating line features deluxe passenger car styling and extra heavy duty bus-type heating and defrosting power with Evans Airfoil fan.

The Super-Deluxe heater-defroster, designated Model MD-10, has five adjustable heat outlets which permit directional control of heat to driver or passenger. Defroster outlets are engineered to meet requirements of every type vehicle. The heater case is aluminum. The extra-large core is heavy gauge brass with copper heat transfer surface. Quiet, low-ampere fan operation is provided by a specially designed "Continuous Service" motor. This mo-

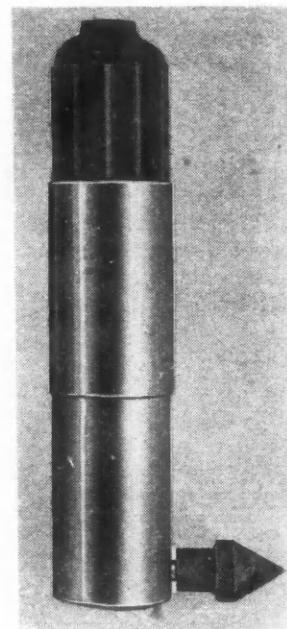


Cutaway view of Evans Super-Deluxe heater defroster

tor is prelubricated by the manufacturer so that further oiling in the field is unnecessary.

F-31—Tachometer Angle Adapter

Type 45 angle adapters for use with Metron hand tachometers are now being delivered by the Metron Instrument Co., 432 Lincoln St., Denver 9, Colo. They permit the measurement of speed in cramped quarters where the clear-



Angle adapter for use with Metron hand tachometers

ance at the end of the rotating shaft is as little as 2 in. They are also useful with the Type 61 disk for measuring linear speeds where clearance to the sides of the moving member is limited.

The angle adapter slips readily over the standard hand type head. It consists of a pair of miter gears supported on permanently-lubricated ball bearings. The tachometer carrying case has space provided for this adapter along with the tachometer itself.

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D-27—Trimming Presses

Chambersburg Engineering Co. — Bulletin 3-L-7 describes and illustrates the company's steel side trimming presses for forge shops and other uses. Special features are illustrated and described, maintenance and safety information is included, together with specifications and dimensions.

D-28—Contour Boring And Turning Machine

New Britain Machine Co., New Britain-Gridley Machine Div.—6-page illustrated folder giving design and operation features of Models 26 and 36 and Models 27 and 37, Precision Contour Boring and Turning Machines. Complete specifications for the four models are included.

D-29—Material Handling Equipment

Lyon-Raymond Corp.—Bulletin No. 201 describes and illustrates general line of material handling equipment including hydraulically-operated lift trucks, pallet trucks, elevating tables, high lift trucks and sheet feeding equipment. Illustrations of typical applications are also included.

D-30—Torsion Testing Machines

Tinius Olsen Testing Machine Co.—Bulletin No. 34 describes the company's complete line of torsion testing machines in various capacities, and gives information on wire twisting equipment and the Tryptometer. Included also is a detailed description of the Olsen Pendulever weighing system, direct-reading, multi-masked dial, electronic variable speed drive loading system and torsion recorder. Power-driven and hand operated models are included as well as capacities and physical dimensions of standard models for both production and research testing.

D-31—Hydraulic Follower Machine

Turchan Follower Machine Co.—Catalog describing how the company's Hydraulic Follower Machine can be used for duplicating dies, molds, patterns or original forms from hard or soft models.

D-32—Pedestal Type Centrifugal Pumps

Allis-Chalmers Mfg. Co.—A new bulletin on Pedrifugal pedestal type cen-

trifugal pumps includes information on five sizes of this pump. In addition to diagraming nine construction features, the bulletin carries pump, motor and Texrope drive selection table to permit correct selection of pump size, motor operating speed and Texrope drive to give capacity desired. Standard dimension tables of the pump are included.

D-33—Involute Spline Cutting Tools

Illinois Tool Works — New booklet containing tooling recommendations for the production of involute splines. The booklet is titled Involute Spline Cutting Tools and deals with the basic principles involved in tooling for the manufacture of various types of involute splines and specifies proper hobs, shaper cutters and broaches for producing each type of spline to dimensions and tolerances specified by the ASA.

D-34—Hydraulic and Centerless Grinding Machines

Cincinnati Grinders, Inc.—Booklet G-566 describes and illustrates Filmatic 6 and 10-inch-L plain hydraulic grinding machines. A full page covers highlights of design and the machine descriptions are accompanied by cross section drawings and charts. Specifications for the two models are given, accompanied by dimensional drawings. Information is given regarding standard equipment (supplied with the machines) and equipment supplied at additional cost; electrical equipment and specifications. Booklet G-570 gives complete information on the No. 3 Center-

(Turn to page 58, please)

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PERSONALS

Recent Personnel Changes and Appointments at the Plants of Automotive and Aviation Manufacturers and Their Suppliers.

General Motors Corp., Chevrolet Motor Div.—**E. L. Harrig**, named National General Service Manager. **J. W. Thompson** has been appointed General Parts and Accessories Manager.

* * *

The Studebaker Corp. — **George E. Westphal**, appointed General Factory Supt., **C. N. Rhoutsong**, Director of Purchases, **R. L. Runkle**, Master Mechanic. **E. M. Douglas** succeeds **Stanley Whitworth**, retiring vice-president in charge of manufacturing for the Studebaker Pacific Corp., **A. G. Lass**, Executive Engineer, **E. J. Hardig**, becomes a member of the engineering committee, **S. A. Jeffries**, Executive Truck Engineer and **R. E. MacKenzie**, Chief Truck Engineer.

* * *

White Motor Co.—**J. D. Courtright** has been named to head the newly formed Service Sales Div., with headquarters at Cleveland.

* * *

Federal-Mogul Corp., Federal-Mogul Service Div.—**Lawrence T. Ryan** appointed Personnel and Industrial Relations Director.

* * *

General Motors Corp., Oldsmobile Div.—**Harry D. Morin**, Service Promotion Manager.

* * *

The Carpenter Steel Co.—**Berton H. DeLong** appointed Vice-President and Technical Director and **George B. Luerssen**, Chief Metallurgist.

* * *

McCord Corp.—**William G. Hancock** has been elected a director.

* * *

United States Rubber Co.—**Walter D. Baldwin**, Director of Manufacturers Sales for Tires Div. **J. Chester Ray**, Sales Manager of Tires Div. **Harry M. Ramsay**, Sales Manager of Fisk Tires Div.

* * *

Thermoid Co.—**L. R. Leaver**, elected President of Joseph Stokes Rubber Co., Welland, Ontario, a Thermoid subsidiary.

* * *

Carlton Lamp Corp.—**Don H. McLeod**, appointed Sales Manager.

* * *

Rinshed-Mason Co.—**Ronald J. Reagh**, Director of Industrial Relations.

* * *

Monsanto Chemical Co.—**Chester L. Jones, Jr.**, appointed Sales Manager of Protective Coatings Dept.

The Lamb Electric Co.—**H. C. McElhone**, elected Vice-President in charge of Sales.

* * *

Hyster Co.—**Paul Rhodes**, appointed Purchasing Agent.

* * *

Wico Electric Co.—**James R. Weaver**, Works Manager of Westinghouse Electric Co.'s East Springfield Works, has been appointed a Director of Wico.

* * *

Aviation Maintenance Corp.—**John G. McKean**, made Vice-President in charge of Administration and Finance.

* * *

Ethyl Corp.—**Malcolm P. Murdock**, Asst. General Sales Manager.

* * *

General Electric Co., Metallurgy Div.—**Robert O. Bullard**, Manager of Metallurgy and Chemical Depts.

* * *

Cummins Engine Co., Inc. — **R. E. Huthsteiner**, Vice-President and General Manager was elected a Director, succeeding the late **Hugh Miller**. **Edwin G. Crouch**, elected Secretary, succeeding **D. C. Bottoroff**, deceased. **W. M. Harrison**, elected Treasurer. **H. L. Knudsen** has resigned as Vice-President of Engineering. He will continue as Director of the Company and Engineering Consultant. **D. J. Cummins** has been made Manager of Engineering and Quality. **W. J. Manning**, Assistant Controller.

* * *

Remington Rand, Inc. — **Colonel Frank J. Atwood** made Vice-President.

The Boyer Campbell Co.—**John F. Phillips**, Director of Sales, and **Kenneth D. McLetche**, Sales Manager of Industrial Equipment Div.

* * *

Jessop Steel Co.—**Richard M. Paxton, Jr.**, elected a Vice-President.

Studebaker Retires Four And Appoints Successors

As a result of its retirement program, Studebaker Corp. has retired four of its major executives and appointed their successors. Retiring are: **Ralph A. Vail**, vice president in charge of manufacturing, who first became associated with the industry in 1904; **A. G. Rumpf**, secretary-treasurer, a Studebaker employe for 47 years; **H. E. Dalton**, comptroller, who joined the company in 1910; and **J. F. Cotter**, general attorney, who has been with the company since 1911. Mr. Cotter will continue as director. **P. O. Peterson**, until recently director of purchases, has been named vice president in charge of manufacturing; **E. E. Richards** has been named treasurer; **Paul M. Clark**, secretary; and **A. J. Porta**, comptroller.

Blanchard Is Sales Director Of Bullard Co., Bridgeport

E. Payson Blanchard has been named director of sales of the Bullard Co. of Bridgeport, Conn. Formerly sales manager, Mr. Blanchard who will be in charge of general administrative sales policies was succeeded by **Frank U. Hayes**, assistant sales manager.

Publications Available

(Continued from page 56)

less Grinding Machine, including design highlights, specifications, electrical equipment, and accessories and attachments.

D-35—Steel Reference And Data Book

Central Steel & Wire Co.—A complete Reference and Data Book on stainless and heat resistant steels gives information on the essential elements, technical information, welding, corrosion and fabricating data. An aluminum stock list and reference book is also available.

D-36—Milling Machines

The Cincinnati Milling Machine Co.—Bulletin M-1532 gives information on the No. 0-8 Vertical Milling Machine. Included are illustrations of the machine, design features, specifications, machine description and applications.

Nos. 1-12 and 1-18 Plain Automatic Milling Machines are described and illustrated in Bulletin No. M-1555.

D-37—Emulsion Spray Method

The Lea Manufacturing Co.—Folder describing its emulsion spray method, for applying all types of compositions on buff wheels with the use of spray guns. Included is a line drawing showing the installation of the Lea semi-automatic foot-timer buff air coating units on a buffing machine.

D-38—Facts and Figures

Automobile Manufacturers Assoc.—The first postwar edition of Facts and Figures, containing several series of civilian statistics dropped during the war, is available by writing to Automobile Manufacturers Assoc., New Center Building, Detroit 2, Mich.

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August 1, 1947

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59

New Machine Tools On Parade

(Continued from page 29)

matically registered before he gets to Chicago, thus materially reducing the usual waiting in lines about the registration desks. Each advance registrant will receive a double card. Half of this will be torn off at entrance, the other half—properly filled out by the registrant in advance will be placed in a card holder and worn as a badge.

Transportation is an enormous problem in Chicago and might appear almost insuperable when it comes to handling thousands of additional people. But that too has been given proper attention. Arrangements are being completed for augmented service on Chicago surface lines and the regular movement of chartered buses starting from Loop hotels and running express to the show. There is a possibility of streamlining the movement of traffic even further by running buses between the show and the Burlington suburban railroad station at LaGrange, then moving by rail into Chicago. This is a bright prospect since the show traffic will run counter to the regular Chicago rush hour traffic.

It was with these problems in mind that show hours were established at 10 a.m. to 5:30 p.m. (Daylight Central Time). Taxicabs are hard to get in

Chicago and may be available only outside of the rush hours, but an attempt is being made to get additional service. Whether or not special rates can be arranged is problematical at this writing. On buses the rate will be 50 cents each way.

There will be a number of special flights from London to New York for visitors to the show. Other airlines, the steamship lines and railroads are cooperating in making advance arrangements for the travel of visitors both from overseas and from all points in the United States. Advance registrations already have been received from 22 foreign countries. They are: Argentina, Austria, Australia, Belgium, British West Indies, Chile, Colombia, Cuba, Denmark, England, Finland, France, Hawaii, Holland, Italy, Mexico, Norway, Palestine, Portugal, Spain, Sweden and Switzerland.

As a part of the general show arrangements there will be a formal preview of the show on Sept. 16. However, this is intended to accommodate a group of specially invited guests among legislators, educators, the press and radio and groups of that kind. The show does not open officially until Sept. 17.

Following the precedent established

at earlier shows, a comprehensive technical program has been arranged by the Machine Tool Congress. Its function has been to organize a program through the cooperation of a group of important national organizations. As a result there will be a series of dinner meetings each evening, beginning with the evening of Sept. 17.

Registration is being organized to make it easy for visitors to get directly into the exhibit without delay. Registration desks will offer other facilities. For example, each visitor will be able to pick up a complete program listing the exhibits and outlining the details of the congress technical program. In addition, they will have available dinner tickets for all of the sessions of the congress. It is expected too that secretaries representing some of the major participating groups of the congress will be on hand at all times to answer questions and offer assistance.

It is well to note that the heaviest attendance as well as the major drain on hotel and restaurant facilities will occur during the opening days of the show. Consequently, many of the delegations might profit by delaying their visit until the following week. This should relieve the burden on facilities.

Novel Method of Determining Engine Knock

(Continued from page 31)

which might falsify the measurement. The piston surface is flush with the end of the threaded plug, and therefore with the inside wall of the combustion chamber. The natural frequency of the quartz-crystal system lies between 35,000 and 50,000 cps. Although the indicator has no water-cooling, errors due to temperature influence are no greater than those due to other sources that are hard to eliminate. These errors are of no consequence in connection with knock measurements, as already explained. The outstanding features of the instrument are its good mechanical properties up to the highest frequencies, and its long life which exceeds that of many aircraft engines. The small, compact form (spanner width, 0.788-0.945 in.; height below electric terminal, 1.69 in.) permits its use even in restricted spaces, as between the fins of an aircooled engine.

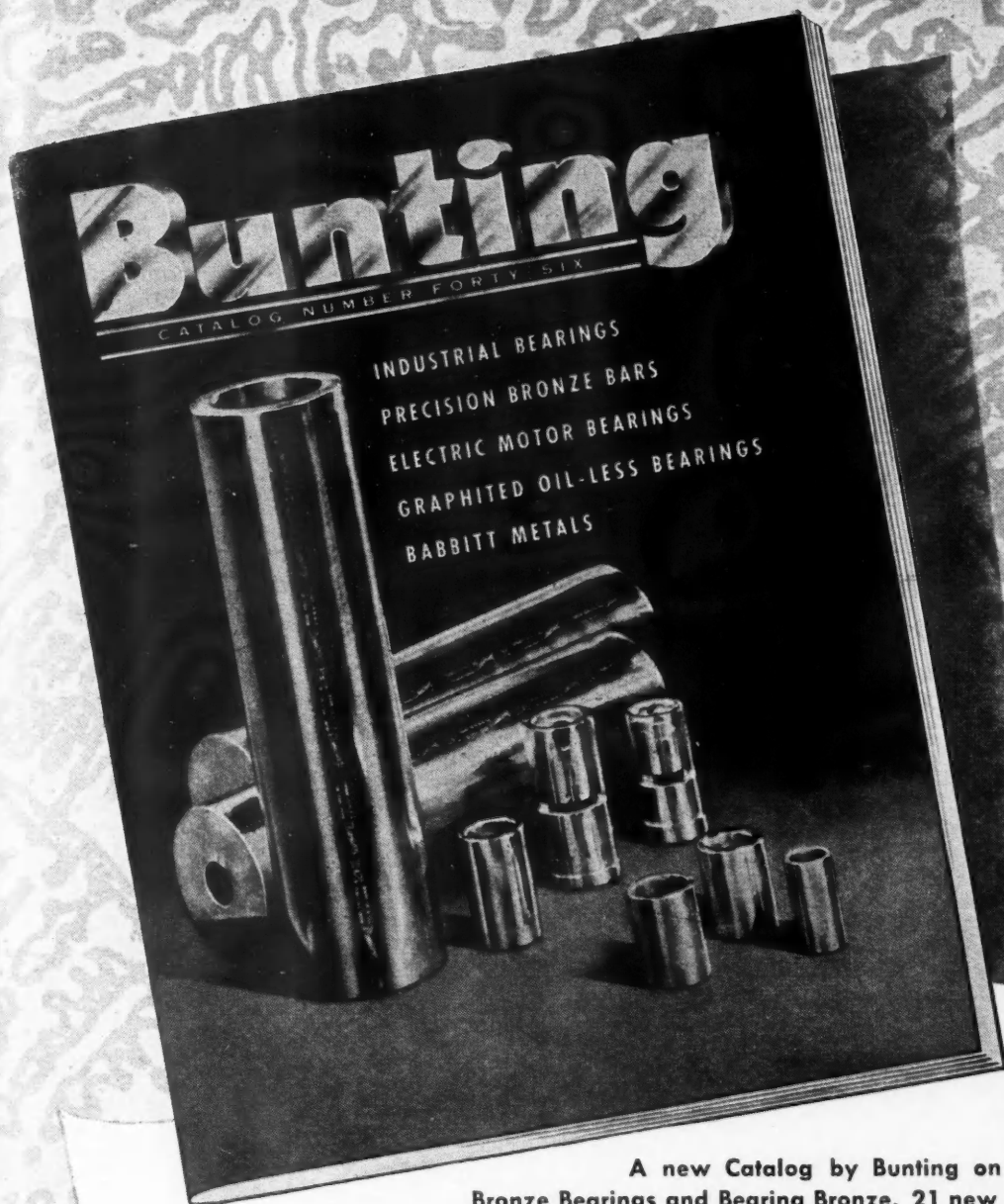
Impulses produced by the indicator are conducted through a cable to the apparatus proper. There they are amplified and then differentiated either once or twice, as desired, and thrown on the screen of the built-in large cathode-ray oscillograph. At the same time the mean value (with respect to time) of the peaks of the d^2p/dt^2 impulses is determined, also by electrical means, and

is indicated on the screen in the front plate. This mean value is impressed on a recording device, a standard two-color point scribe, with the aid of two bushings which otherwise are short-circuited by a plug. The point scribed records the mean value every 10 sec. This time-base diagram must then be transformed into one whose abscissas represent the momentary charging pressures, in psi or in. of mercury column, and whose ordinates represent the mean value of the knock intensity (Fig. 3). The second color of the scribing device is used to show the periods of time during which the engine was operating under the desired conditions. With the aid of the curve strip it is then possible to determine at any convenient time how the knock intensity varied outside the regular measuring periods and whether at each measuring point sufficient time was allowed to elapse for the engine temperature to become stabilized.

For a long time efforts were made to define the knocking characteristics of a fuel, but more recently the view has gained ground that what actually limits the range within which the engine may be operated continuously is the point of incipient knock for a certain charging pressure and certain other operat-

ing conditions. Beyond this limit the thermodynamic efficiency decreases and the engine is so overstressed that rapid destruction results. It is of little interest to know how severely the engine would knock within the operating range beyond the point of incipient knock, because it must not be operated within that range.

By this limiting - charging - pressure method it is possible to compare not only different fuels in the same engine, but also different engines on the same fuel. This has so far been impossible with the CFR method, which is tied to the CFR engine. It is of great importance, moreover, that by this new method fuels can be tested directly in the engine in which they are to be used under service conditions. In this connection it may be recalled that the order or sequence of anti-knock values of different fuels in different engines is not always the same. For instance, fuel A may begin to knock earlier than another fuel B in the CFR engine, yet in an aircraft engine fuel B may show up to better advantage. These deficiencies, which have been made very apparent through years of use of the CFR method, are completely overcome in this method based on pressure acceleration of determining the start of fuel knocks.



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Briggs Adopts Lacquer-Drying Ovens

(Continued from page 33)

surfacers drying ovens are each 212 ft in length, 8 ft 4 in. inside height, and 8 ft 8 in. inside width. They have four zones, the entry zone providing a heat input of two-million Btu/hr while the remaining zones hold the specified temperature with an input of 500,000 Btu/hr. Each oven has 156 of the nozzles, mentioned earlier, while the capacity of the circulating fans in each unit is of the order of 41,675 cfm.

A battery of four dry-off ovens are each 84 ft long, while the two ovens for the lower and solid lacquer dry are 178 ft in length. In all, the combined length of the new ovens is 2096 ft. Total fan capacity of the oven installation is 374,600 cfm and total burner capacity is 35,500,000 Btu/hr.

Since the surfacer used on these bodies is of synthetic type, the drying temperature can be held quite high. In current production it is held at 325 F, the length of the drying cycle being 23 minutes. Lacquer drying, on the other hand, must be done at a lower temperature consistent with the characteristics of the finish. Consequently, the lacquer ovens are held at a temperature of 200-225 F, the drying cycle being timed at 19 minutes.

The plant also boasts a comprehensive system of spray booths. In all there are 13 major spray booths having a total length of 872 ft. They are served by a battery of fans with a capacity of 1,048,600 cfm; and a total water circulation of 21,000 gpm. The paint distribution system is centralized at a remote location on a first floor mezzanine for better quality control and operating economy, and contains approximately ten miles of piping for the delivery of some 18 different colors to each spray booth.

The entire plan has been mechanized in keeping with advanced methods of materials handling, boasts almost five

miles of conveyor lines of various kinds.

The use of modern methods—equipment, techniques, mechanization — as well as the development of rhythmic flow along the shortest possible path sometimes masks the fact that basic operations such as body finishing, body-in-white, and body trim encompass an amazing variety of detail operations. The process moves so swiftly and so surely as to produce the appearance of complete simplicity, but actually it is a complex procedure. To show what we mean, consider the steps required to complete the painting of a lacquer-finished body at the Conner plant. In going over the following sequence bear in mind that it does not begin to enumerate the many repair operations sometimes necessary on a given body.

1. Wipe and attach stone shields, vent lids and small parts to body.
2. Clean with thinner.
3. Acid clean.
4. Automatic water wash.
5. Blow off.
6. Oven dry (8 min.).
7. Spray and apply sound deadener and sealer.
8. Tack rag.
9. Spray gun glaze and spray surfacer.
10. Oven dry.
11. Surfacers sand body and stone shields.
12. Block sand.
13. Wash.
14. Oven dry (23 min.).
15. Inspect after surfacer sand.
16. Surfacers pickup.
17. Blow off.
18. Additional sand, spot putty and pickup.
19. Inspect.
20. Spray under fenders.
21. Gas off and tack rag.
22. Spray primer.
23. Lacquer spray monotone, ground or color and upper or lower two-tone.
24. Oven dry (19 min.).
25. Inspect after lacquer dry oven.
26. Sand lacquer repairs.
27. Lacquer repair spray.
28. Oven dry (6 min.).
29. Additional sand and repair.
30. Mask and paper.
31. Tack rag.

32. Spray two-tone upper or lower and special monotone.
33. Remove tape and paper.
34. Oven dry (19 min.).
35. Lacquer sand body and stone shield complete.
36. Blow off body.
37. Polish body and stone shields comp.
38. Buff polish.
39. Clean up.
40. Inspect after polish clean up on O.K. line.
41. Spot sand.
42. Hand brush trunk comp. and rear door striker plate.
43. Spray repair.
44. Oven dry.
45. Repair sand.
46. Repair polish.
47. Clean up.
48. Final paint inspection.

On the first floor where body fabrication and body-in-white lines are concentrated, Briggs methods are expressed in production short cuts of interest to the industry. While space does not permit a detailed analysis of these operations, special mention can be made of the merry-go-round assembly lines for sub-assembly welding of elements such as the top and side panels. Although these conveyor lines are new they stem from procedures used at Briggs for many years.

The simple form of the building—practically a rectangle with one diagonal side—lends itself admirably to the layout of the second floor in long parallel lines. Operations begin in the top right hand corner of the floor plan where an inclined track conveyor transports bodies from the end of the body-in-white line on the first floor. Bodies then move progressively to the end of one line, turn to go through the next line to the opposite wall, and continue the circuit until the last finishing touch has been made and accepted. Then the painted bodies move on to another inclined track leading downward to the first floor to meet the start of the trim line.

Lowering Production Costs on Bumpers and Springs

(Continued from page 26)

cation of trolley wheels and other moving parts must be kept to a minimum.

The storage of nickel plated bars is a problem due to scratches in the plated surface. To overcome this a hook-type conveyor is used to transport material from the plating line to buffing line, and also to storage for some types of bars. Several hundred bars are hung on this conveyor to keep them out of racks and to eliminate handling.

The final inspection of the plated bumper requires good light and a keen eye. To facilitate this operation a spe-

cial type conveyor (see Fig. 5) was designed to move the bumpers past the inspectors with the plated surface toward the light. As they progress along the conveyor, they are cleaned and inspected for scratches or faulty plating. After inspection they are hung on a hook conveyor for transportation to the warehouse for final packing and shipping.

Bumper brackets are Bonderized, enameled, baked and transported to the warehouse on a hook conveyor, as shown in Fig. 6. This photo shows the brackets entering the spray Bonderite

unit at the rate of 800 per hour. This conveyor is approximately 1300 ft long and is driven by twin drives and fluid couplings to give smooth operation.

All finished parts are packed on pallets for shipping, as illustrated in Fig. 7. The pallets are stored awaiting shipment and then moved and loaded in cars by power lift trucks. The palletizing of finished parts for shipment has resulted in a substantial saving to the company and its customer who moves the loaded pallet to his assembly line unloads the parts, and then returns the pallets for future loading.

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ARO AIR TOOLS

Epicyclic Gear Systems—

(Continued from page 40)

varied, but the input will always be engine torque. When a fluid fly wheel is used with differential gearing, both the input torque and output torque may be varied to alter the capacity size or load speed characteristics of the fluid fly wheel. The torque capacity of a fluid fly wheel varies substantially as the square of the difference of the input speed of the impeller for a given output speed of rotor.

Regenerative Gearing

A regenerative planetary gear system arranged with a hydraulic torque converter is shown in Fig. 2, with components lettered the same as Fig. 1, and having the same dimensions as those in Fig. 1. In this case the hydraulic impeller and sun gear turn with the engine, but the planet cage turns with the hydraulic rotor. This system is analyzed in Table II in the same manner

as was done with Table I. The figures in column 3 were set down first, using for comparison the same figures as those in column 3 of the non-regenerative analysis. The other values were found in a manner similar to the preceding case. It should be noticed, however, that the torque load imposed upon the rotor is greater than the torque load input or output. The power passing through the hydraulic unit always exceeds the power input or output. Also, the overall efficiency at all points in the regenerative circuit is lower than the hydraulic efficiency; but in non-regenerative, just the opposite is the case.

The hydraulic impeller of this regenerative system must transmit from 133 to 180 lb ft torque where the hydraulic impeller of the non-regenerative system is called upon to transmit only from 5 to 40 lb ft torque at the same overall torque ratios. Therefore, the turbo of the regenerative system must be large to handle the increased torque at the same hydraulic efficiency.

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CALENDAR

Conventions and Meetings

- Institute of the Aeronautical Sciences,
Annual Summer Mtg., Los Angeles,
Aug. 7-8
- Soc. of Automotive Engineers—West
Coast Transportation & Maintenance
Mtg., Los Angeles....Aug. 21-22
- Natl. Air Races, Cleveland...Aug. 30-Sept. 1
- Amer. Soc. of Mechanical Engineers—
Fall Mtg., Salt Lake City.....Sept. 1-4
- Amer. Soc. of Mechanical Engineers—
Ind. Instrument & Regulators Div.,
ChicagoSept. 8-9
- Instrument Society of America Conference,
ChicagoSept. 8-12
- Society of Automotive Engineers—
Tractor Mtg., Milwaukee....Sept. 17-18
- Natl. Machine Tool Builders Assoc.
Machine Tool Show, Chicago,
Sept. 17-18
- Soc. Automotive Engineers, Aeronautic
Mtg., Los AngelesOct. 2-4
- Amer. Soc. of Mechanical Engineers,
Petroleum Mech. Eng. Conf.,
Houston, Tex.Oct. 6-8
- Natl. Conference of Industrial Hy-
draulics, ChicagoOct. 16-17
- Soc. of Automotive Engineers, Production,
ClevelandOct. 20-21
- Amer. Soc. Tool Engineers—Semi-Annual
Mtg., Boston.....Oct. 30-Nov. 1
- Natl. Electrical Mfrs. Assoc., International
Lighting Exposition & Conference,
ChicagoNov. 2-5
- Amer. Society of Body Engineers, Annual
Tech. Convention, Detroit,
Nov. 5-7
- Society of Automotive Engineers, Fuels
& Lubricants Mtg., Tulsa....Nov. 6-7
- Society of Automotive Engineers—Air
Transport Mtg., Kansas City...Dec. 1-2
- Amer. Soc. of Mechanical Engineers,
Annual Mtg., Atlantic City....Dec. 1-3
- Automotive Service Industries Show,
ChicagoDec. 8-11
- Soc. of Automotive Engineers Annual
Mtg., DetroitJan. 12-13

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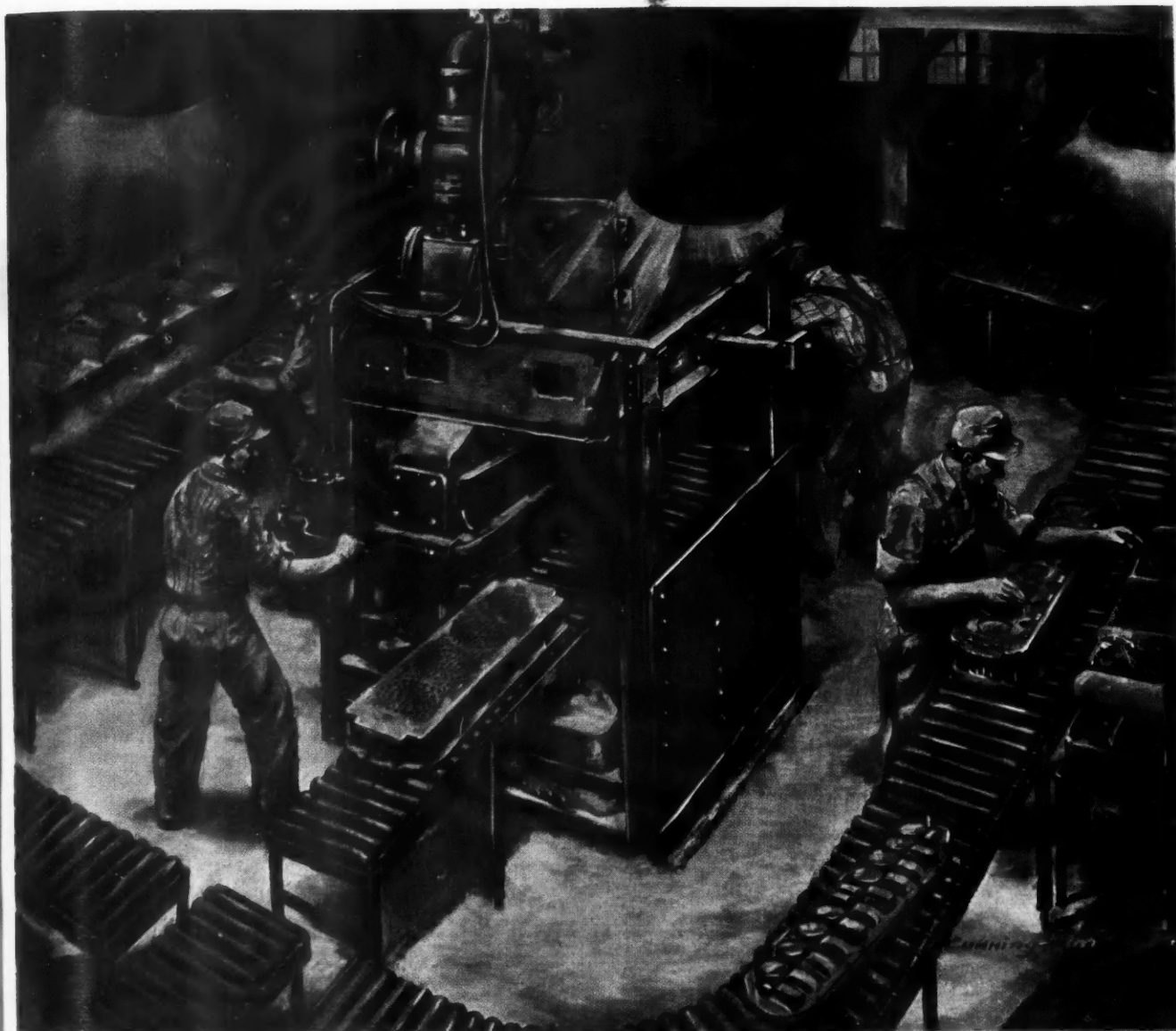
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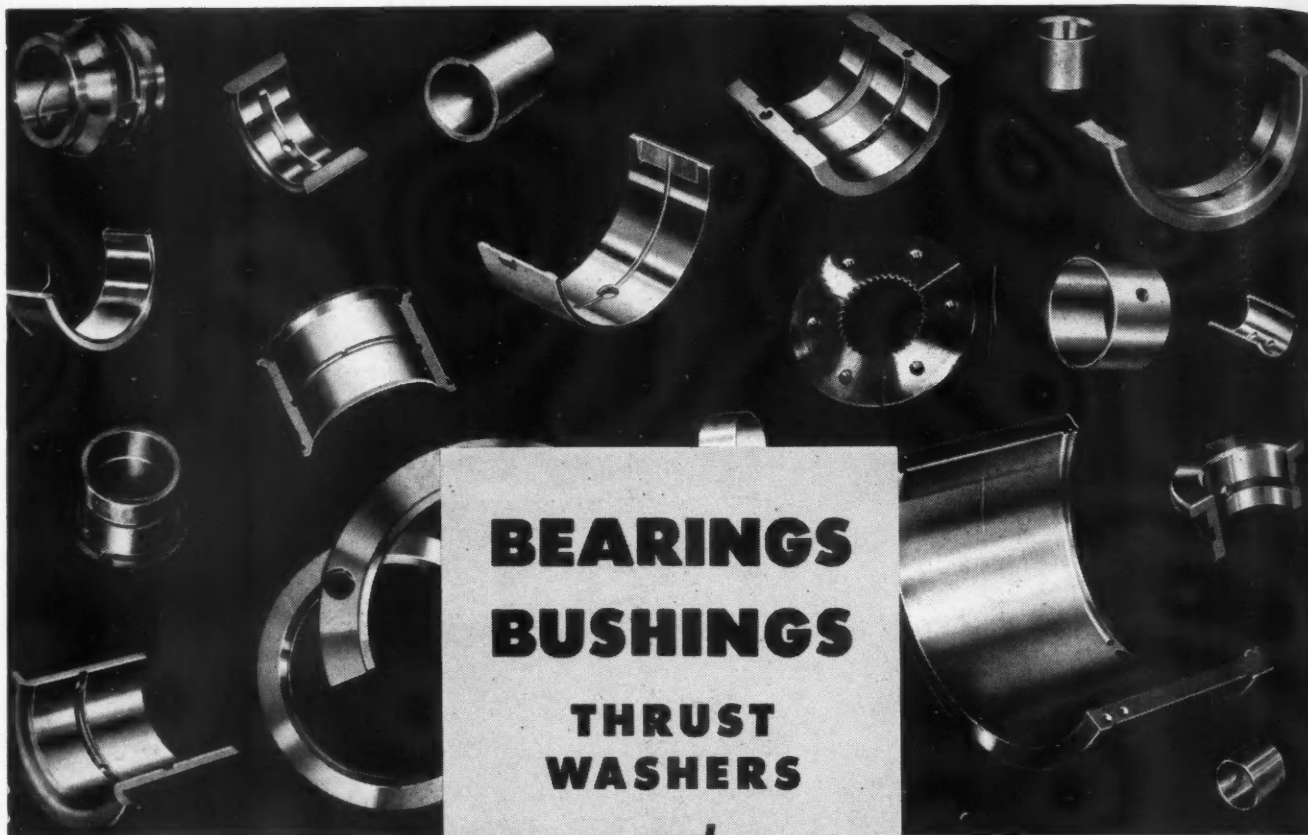
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General News

(Continued from page 23)

stimulus of high prices. Mexico and Canada have been shipping large tonnages in. No weakness in price in the next few months is expected.

Cadmium

Pressure for cadmium deliveries has eased somewhat recently, producers report, although it is still in limited supply. The answer may be that in certain fields there have been cut-backs in consumption; in the case of cadmium for bearings this is apparently correct.

E.R.A. Co. Quite Active

In an article entitled "Design Highlights of New Cars in the Indianapolis Race" in the June 1st issue of *AUTOMOTIVE INDUSTRIES*, it was incorrectly stated on page 30 that the renowned E.R.A. Co. (English Racing Automobiles Ltd.) was defunct. We are pleased to be able to report that we have since been informed by A. Barratt, Director-Technical of E.R.A., that the contrary is true and that this well known English racing car manufacturer is quite active.

Standard Concentrates on One Model—The Vanguard

A direct result of the adoption of the flat rate system of taxation by Chancellor of the Exchequer Dalton is a reduction in the number of types of cars to be manufactured and a general increase in piston displacement and body dimensions. It is understood that in several cases plans for new diminutive popular cars have been shelved.

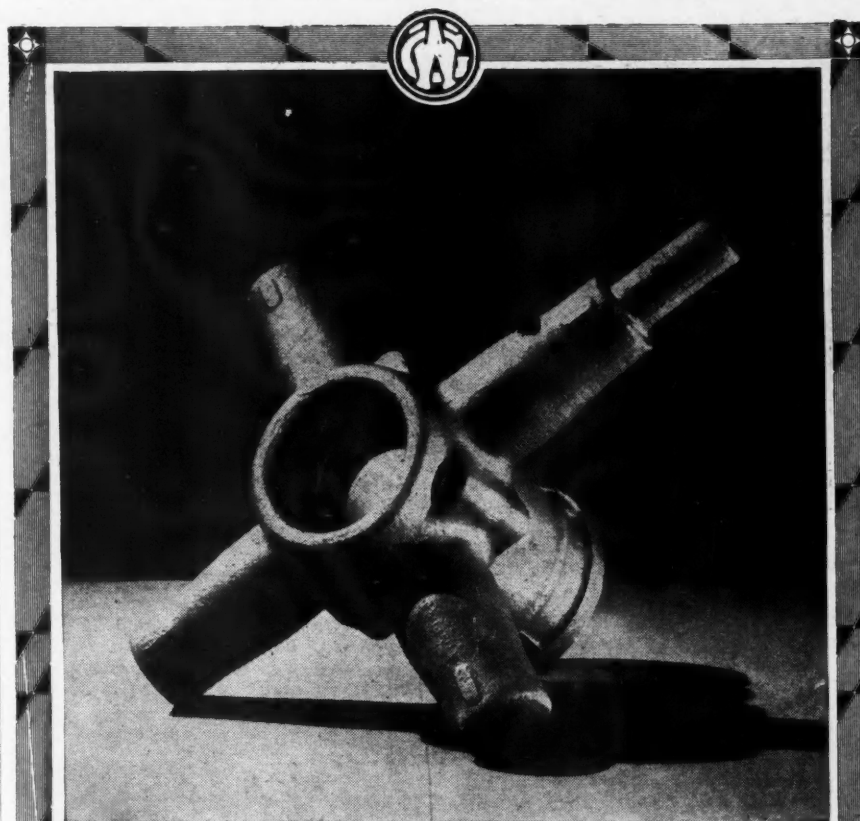
Standard Motor Co. will drop production of its eight, 12 and 14 hp models, and a new Vanguard will replace all models with the exception of farm tractors. The Vanguard will have a four cylinder, valve in head engine of 3.15 in. by 3.62 in. bore and stroke. Many of the engine parts will be interchangeable with those used on the Ferguson tractor engine. The car will have a wheel-base of 94 in., a front track of 50½ in., a rear track of 54 in. and an overall length of 13 ft, 7¼ in. Features are a compression ratio of 6.8, three bearing crankshaft, A.C. fuel pump, Solex downdraft carburetor, Borg & Berg clutch, cam and roller steering gear, and three speed synchromesh transmission, with control lever on the steering column. Power output is 55 hp at 3000 rpm and 65 hp at 4500 rpm. Weight with a four-door five-passenger body is said to be 2350 lb. Coil spring independent suspension is used in front, with

(Turn to page 76, please)

Shipments of Complete Aircraft and Other Products of Aircraft Plants, 1947*

	April	March	Four Months
Complete Aircraft.....	2,143	1,922	8,355
For U. S. Military:			
Number of Planes.....	105	137	452
Value of Planes and Parts.....	\$33,434,597	\$34,548,763	\$148,963,896
For Other Than Military:			
Number of Planes.....	2,038	1,785	7,903
Value.....	\$18,331,640	\$14,393,256	\$48,836,640
Under 3000 pounds			
Number.....	2,006	1,762	7,817
Value.....	\$6,518,657	\$5,908,246	\$25,573,353
3000 pounds and over			
Number.....	32	23	86
Value.....	\$11,812,983	\$8,485,010	\$23,263,285
Parts for Other Than Military.....	\$1,506,015	\$1,505,629	\$6,024,718
Conversions:			
Number of planes.....	21	20	96
Value.....	\$1,917,123	\$2,175,790	\$8,331,428
All Other Products, Value.....	\$3,314,461	\$2,740,397	\$11,080,950
Total Value of Products.....	\$58,505,836	\$55,363,825	\$223,237,632

* Bureau of the Census and Civil Aeronautics Administration.



Many forging designs in steel, aluminum and magnesium have been originated by Wyman-Gordon. Typical of the many intricate forgings is this four-way spider. . . . Every Wyman-Gordon forging is under strict, constant control by laboratories that through the years have contributed much to investigation and research of new forging techniques and of new alloys of steel and the non-ferrous light metals.

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Method of Computing Effective Valve Area

(Continued from page 35)

crease in lift. In the table, the greatest error of 9.3 per cent occurs with valve No. 2, which has a very narrow face. Note that with valve No. 1, which has the same lift but a wider face, the error is negligible. Valves No. 3 and 5 are for truck engines, and the former has an unusually high lift for the diameter.

For lifts requiring formula (2), if the width of the valve face, lift, and

angle θ are fixed, the area varies directly as the diameter; that is, if d , and d , are doubled, the area is doubled. For lifts requiring (1), under the same conditions the increase in area is slightly less than in direct proportion.

With a given lift the area of a valve increases as the seat angle is reduced, the maximum area being obtained with a flat seat; that is, when $\theta = 0$. The area in this case corresponds to the

lateral area of a right cylinder with a diameter d , and altitude h , so that $a = \pi d h$. The usual method of determining the advantage in area to be gained by reducing the seat angle is on the basis of the same clear diameter, d , and the use of formula (1). The method is open to criticism. From the standpoint of space taken up in the combustion chamber, which is apt to be limited, it is the large or overall diameter of the valve which is important. If the same width of face is assumed, which is logical, the large diameter of a valve with, for example, a 30 degree seat will be somewhat greater than that of a valve with a 45 degree seat and the same small diameter, and the comparison is unsound because a larger 45 degree valve could have been used within the same combustion chamber limits. Obviously such comparisons should be made on the basis of the same large or head diameter, in which case the advantage in area gained by the use of a smaller seat angle will be partially offset by the enforced reduction in the small or clear diameter.

In view of the foregoing, it will be clear that with a given lift the increase in area gained by reducing the seat angle from say 45 degrees to 30 degrees will not be a fixed ratio, but will depend upon the valve dimensions. Calculations should be based on the use of the correct formula in each individual case. At maximum lift, formula (2) usually will be required for the 45 degree valve, while (1) frequently will be required for the 30 degree valve.

If the large diameter and face width of a 30 degree valve are made the same as for a 45 degree valve, a formula for obtaining the small diameter of the 30 degree valve may be derived as follows:

$$AW_{30} = AB_{45} \cos 30^\circ$$

$$d_{30} = d_1 - 2 AW_{30}$$

$$\text{or } d_{30} = d_1 - 2 AB_{45} \cos 30^\circ$$

In table 2 are given some comparisons of valves with 45 degrees, 30 degree and flat seats made on the basis of the same large diameter and width of face in each case. No. 1 is that of a valve with a wide face at maximum lift. It will be seen that the increase in area gained by reducing the seat angle from 45 to 30 degrees is 15.5 per cent. No. 2 is that of a valve with a narrow face at maximum lift. Note that the gain in area obtained by reducing the seat angle to 30 degrees is only 6.5 per cent. This might lead to the impression that there is little advantage in reducing the seat angle to 30 degrees when the face is narrow. It is necessary to remember, however, that gas is passing through the valve throughout the time it is opening and closing. Nos. 3 and 4 show the situation when the lift is 0.10

(Turn to page 86, please)



BUT...

Though it was the pride of the early pioneers, in their push westward, it would be entirely inadequate for present day high-speed, heavy load, transportation needs. Today's huge modern, transcontinental trailer-trucks, testify to the triumph of American progress.

Duridine *

is just as remarkable an improvement, in the metal-cleaning field. It cleans—removes oil and grease—and other surface soil—phosphatizes and changes the metallic surface into a non-conductive phosphate film, of uniform crystalline structure—provides a durable bond for organic finishes.

DURIDINE provides extraordinary protection for painted metal surfaces. It is applied by means of mild steel power-spray washers—and is a thorough, speedy and simple process.

* Trade Mark Reg. U. S. Pat. Off.

CHEMICALS
ACP
PROCESSES

RUST PROOFING AND PAINT BONDING

*Granodine **
*Duridine **
*Alodine **
*Lithofarm **
*Thermail-Granodine **

RUST REMOVING AND PREVENTING

*Deoxidine **
*Peraline **

PICKLING ACID INHIBITORS

*Rodine **

AMERICAN CHEMICAL PAINT CO.
AMBLER PENNA.

I HOOK UP WIRE—



I SEAL A CAN—



I PATCH



A HOLE—OR MEND A PAN



I WIPE



A JOINT—AND FILL



A DENT—I RUN A SEAM



—OR FIX



A VENT

what am I?

► I'm a low-melting, free-flowing alloy that bonds quick as a wink. Know me? I come from a complete line of non-ferrous metals and alloys you can get easily anywhere in the United States. Know me now? I'm solder, of course. Federated solder.

And each Federated solder is but one of a tremendous family of "joiners". Federated solders are supplied in all commercial forms and compositions. Federated solders are made to fit the job—to provide low-melting, quick-freezing, a specific plastic range, or other required properties.

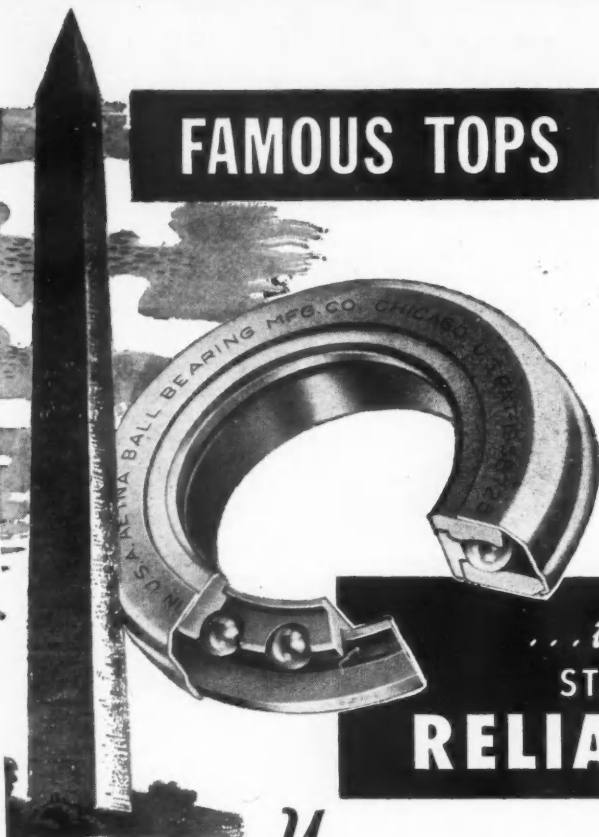
This complete line is your assurance that Federated can supply you with the exact solder in the form you need. And Federated's technical representatives are glad to help you solve industrial soldering problems. For information and prices, call or write
Federated Metals Division, American Smelting and Refining Company at 120 Broadway, New York 5, N.Y., or the office nearest you.

Federated METALS DIVISION
AMERICAN SMELTING AND REFINING COMPANY

JMLCO 9-615



FAMOUS TOPS



...they both
STAND FOR
RELIABILITY

YOU always want them, demand them, in equipment as in men: those tough, enduring qualities that produce utter reliability. They're built into the Aetna "T" Type Bearing.

Here, truly, is a product proved by time, and in those vital spots of hardest service. No wonder that most automotive manufacturers look upon it as a "Must" for clutch release duty—

- the exclusive "T" type retainer maintains precise alignment —no eccentric thrust, no chatter, no excessive wear
- oil impregnated bronze retainer—smooth, silent bronze-to-steel contact
- permanently sealed-in lubricant

It's a trusty sign of dependability in any vehicle—the famous Aetna "T" Type Bearing. Let's talk about it for your product.

AETNA BALL & ROLLER BEARING CO.


4600 Schubert Avenue, Chicago 39, Ill.

In Detroit: Sam T. Keller

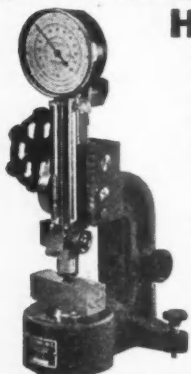
7310 Woodward Avenue

Phone: Madison 8840-1-2

MAKERS of
THRUST BALL BEARINGS,
Standard and Special
ANGULAR CONTACT
BALL BEARINGS
ROLLER BEARINGS
Special,
BALL RETAINERS,
HARDENED and
GROUND WASHERS

Aetna  **BALL & ROLLER BEARINGS**

HARDNESS TESTING



The STANDARD SCLEROSCOPE (Now highly improved) for more than twenty years has made good and is still used for doing the world's hard work in testing. In general use for specifications purposes. Simple, Sturdy, Comparatively Inexpensive. Illustrated bulletins free. **FOR QUALITATIVE AND QUANTITATIVE HARDNESS MEASUREMENT**, under Static Pressure, the MONOTRON is the only machine now available. Operative up to over 2000 Diamond Brinell. Avoids errors due to spring in test pieces. Takes readings with the load on, avoiding reversal lash errors. No setting to zero. Operates at highest Speed. Has solved many old laboratory and shop problems. We also make the Durometer for testing the hardness of rubber. Comprehensive bulletins free.

THE SHORE INSTRUMENT & MFG. CO.
Van Wyck Ave. and Carll St., Jamaica, New York, N. Y.
Agents in all Foreign Countries

**Buy
Bonds**

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Moderate reductions in general business activity are indicated. The *New York Times* index for the week ended July 5 stands at 133.6, as against 140.7 for the preceding week and 123.3 a year ago.

Sales of department stores during the week ended July 5, as reported by the Federal Reserve Board, equaled 207 per cent of the 1935-39 average, as compared with 245 per cent in the week before. Sales were 8 per cent above the corresponding distribution a year earlier, as against a preceding similar excess of 3 per cent. The total in 1947 so far reported is 10 per cent greater than the comparable sum in 1946.

Electric power production increased slightly in the week ended July 5. The output was 10.9 per cent above the corresponding amount in 1946, as compared with a like advance of 13.1 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 629,204 cars, 25.6 per cent less than the figure for the week before and 7.4 per cent below the corresponding number recorded last year.

Crude oil production in the week ended July 5 averaged 5,065,200 bbl daily, or 43,900 bbl less than the preceding average but 159,750 bbl above the comparable output in 1946.

Production of bituminous coal and lignite during the week ended July 5 is estimated at 1,940,000 net tons, 76 per cent less than the output in the week before. The total production in 1947 so far reported is 29 per cent above the corresponding quantity in 1946.

Civil engineering construction volume reported for the week ended July 10, according to *Engineering News-Record*, is \$78,690,000, or 26 per cent less than the preceding weekly figure and 48 per cent below the comparable sum in 1946. The total recorded for 28 weeks of this year is 2 per cent less than the corresponding amount in 1946. Private construction is 11 per cent below that a year ago, but public construction has increased by 14 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended July 5 is 148.0 per cent of the 1926 average, as compared with 147.6 for the preceding week and 117.2 a year ago.

Member bank reserve balances increased \$202 million during the week ended July 9. Underlying changes thus reflected include a reduction of \$110 million in Reserve bank credit and a decrease of \$92 million in Treasury deposits with Federal Reserve banks, accompanied by a decline of \$46 million in money in circulation.

Total loans and investments of reporting member banks increased \$86 million during the week ended July 2. An increase of \$52 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, \$11,809 million shows a net increase of \$3,334 million in 12 months.

Announcing

A NEW TOOL ROTATING DOUBLE END CHUCKING MACHINE

Fast Index, Power Chucking, Steady High Production

Featuring 1. A four-chuck horizontal indexing turret with three work spindles on each side. One position for loading. Rough and finish bore, face, drill or ream in the first two positions; finish ream or thread in third position.

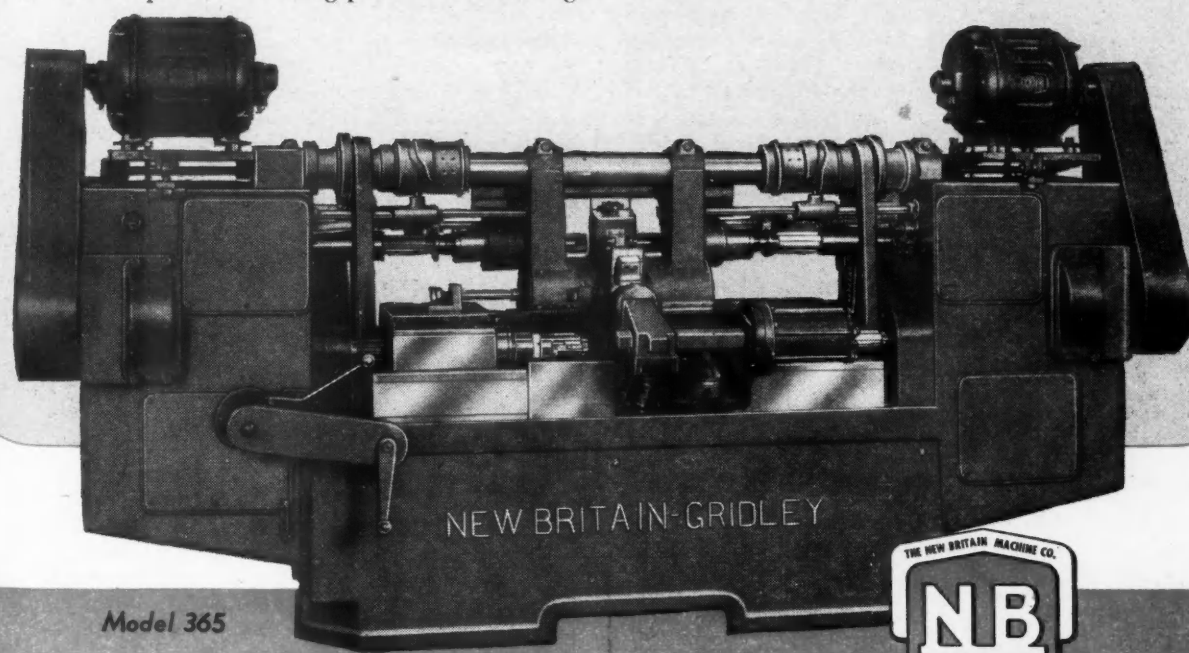
2. Over-all weight, power, and rigidity make possible the use of carbide tools and dampen any tendency to vibrate when running at high speeds.

3. Anti-friction spindles mounted in positionable quills carried in slides to minimize overhang. Spindle speeds up to 2,000 RPM have been provided for fast machining of non-ferrous metals.

4. Ease of operation. Loading position is waist high.

All controls within easy reach of operator. Automatic chucking quickly accomplished. Many types of pieces may be magazine loaded. Until fully inter-locked safety devices are satisfied, turret will not index nor tools jump.

5. High production. Rapid jump and drawback on all feeds. Total idle time of index - 1.67 seconds. Two pieces may be finished at one chucking on some jobs. Geneva motion index and locking mechanism completely enclosed and guarded against dirt and chips. Either lead screw threading or lead cam threading to take full advantage of self-opening dies or collapsing taps available in No. 3 position. Threading spindles may have different speeds and feeds and will reverse within closest limits on each successive cut.



Model 365

IN THE MIDST OF EVERYTHING AT THE SHOW

We will have one of these machines in our Booth No. 311 at the Show. We will also have a complete line of six spindle automatic screw machines, four, six and eight spindle chucking machines, a precision contour turning and boring machine, and a new revolutionary turret lathe. We'll be seeing you September 17.

M-01059

August 1, 1947



NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

When writing to advertisers please mention AUTOMOTIVE INDUSTRIES

Technical Information
on FELT... No. 1

FELT WICKS

RELIABLE, CONTROLLED LUBRICATION

Four Basic Wick-Feed Lubrication Systems Meet Diverse Requirements
Design Is Simple, Cost Is Low, Reliability and Long Life Assured

Lubrication by means of felt wicks permits oil to be fed to bearings and other moving parts, automatically and without failure or interruption. Wicks permit extremely fine control of lubricant, from many drops to a small fraction of a drop per minute. Where actual consumption of oil is low, oil-impregnated felt makes possible the use of completely enclosed parts, such as sealed bearings, and is in fact essential to them. In such applications it can be expected that lubrication will be supplied throughout the life of the part, and that no attention will be required between major overhauls.

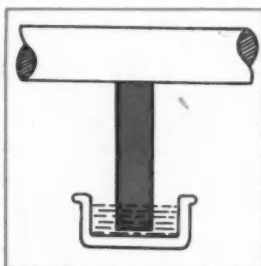
The cost of a felt wick is low, in fact infinitesimal compared with the cost of the machine or part whose performance it protects.

TYPES OF WICK OILERS

There are four types of wick lubrication systems. Choice of any given type depends upon such factors as the lubrication needs of the moving part, accessibility, available space, operating and servicing conditions, and similar matters of design and use. The Engineering and Research Laboratories of the American Felt Company will gladly collaborate with you in working out the design of the most desirable type of system and in selecting the proper size and grade of wick.

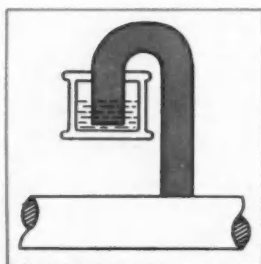
1. BOTTOM WICK OILER

In this type, the felt wick is immersed in a reservoir of oil beneath the bearing, and through capillarity carries the oil upward to the point of lubrication. Maximum vertical wicking distance, about 6 inches. This is generally considered the most efficient system. Unused oil is returned to the reservoir, and no attention is required beyond occasional cleaning and replenishing of oil as required. An ideal system for apparatus such as motors, generators, and factory equipment.



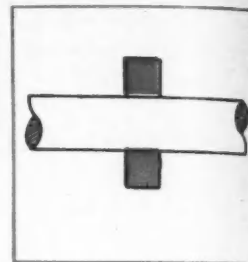
2. SYPHON WICK OILER

Felt wicks of this type are widely used, particularly where oil is to be delivered uniformly and at a controlled rate to a remote friction point. In addition to other methods of control, the flow of lubricant can be increased by increasing the vertical wicking distance from the reservoir to the point of lubrication, taking advantage of gravity.



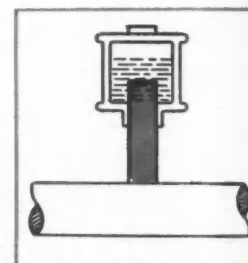
3. ABSORBENT OR PAD FEED OILER

Here the lubricant is contained entirely within the felt, and is released automatically as required. This is the type often employed in sealed installations, though it may also be used in conjunction with a filler tube, the chief purpose of which is to act as a small reservoir. The oil absorption or storage capacity of felt is high. For example, SAE F-10 felt, recommended for pad oiling, will store oil of any viscosity to the extent of approximately 450 per cent of its own weight.



4. TOP FEED OILER

The reservoir is above the lubrication point, and oil is supplied through a felt wick inserted in an outlet in the bottom. In this case, the wick acts as an obstruction to control the flow of oil. Frequently the wick is mechanically constricted to effect further control while taking advantage of storage capacity between constriction and delivery point. This insures uniform lubrication and provides a surplus reserve of oil in the event of an empty reservoir.



SELECTION OF WICK FELTS

There are four types of felt recommended for wick lubricating systems. The physical characteristics of each are under complete control, and are standardized. As much care should be exercised in wick selection as in the choice of lubricants. The felt must have high absorption capacity and capillarity. Porosity must be controlled, filter action must be excellent, density, size, fibre quality and acid neutrality must be governed within close limits. Acid neutrality is necessary to avoid breaking down the oil or corroding metals. The wick must be highly cohesive, which requires medium to long fibres. Residual ash content must be low, to minimize glazing or scoring at the delivery point. All these requirements are thoroughly understood by American Felt Company engineers and production men. Manufacture, test and inspection methods have been developed over a long period of years, resulting in complete uniformity within the four grades, and reliable, predictable performance. The four grades are as follows:

No.	SAE Standard	Type of Wick or Lubricating System
7546	F-1	Round, Strip, Punched
7545	F-5	Strip, Washer, Absorbent Pad
51018	F-10	Absorbent Pad, Washer
51002	F-50	Ball Bearing Seal



Generator commutator end bearing lubricated with SAE 20 oil with a bottom wick oiler. A 3/16" diameter American Felt Co. Mdse 7546 wick with a wicking distance of approximately 1 inch is used for this critical lubricating job. With a shaft speed of 9000 RPM and a 200-hour oiling schedule these wicks always equal the life of the bearings, which are replaced after 100,000 miles or 2000 hours continuous operation.

Courtesy Delco-Remy Division

HOW SUPPLIED

Wick felts are furnished either in bulk, or ready-cut into wicks to your own specifications, round, square, strip, pad, punched, or special types to meet your needs. By use of precision cutting machines of modern design, American Felt Company wicks are customarily supplied with a dimensional accuracy of plus or minus .005 inch.

OTHER USES

Felt wicks can of course be used to carry or control a wide range of fluids, such as water, ink, solvents. Felt can also be impregnated with viscous or solid lubricants such as grease, glycerine, dispersions of micronized graphite, tallow, hydrogenated and sulphonated oils, silicone greases, and with various waxes, thus providing protection at points where loads and speeds are such that oil is not required.

SEND FOR DATA SHEET

The material in this advertisement has been condensed from American Felt Company Data Sheet No. 6, "Wicks and Lubrication." This eight page Data Sheet is the basic authority upon the subject. It contains full technical data, including formulae, charts and graphs, tables. From it any engineer can calculate wick performance and arrive at a design and specification that will meet the requirements of a given application. Write on your letterhead and a copy will be sent you. Along with it you may wish to receive a list of the 15 American Felt Company Data Sheets containing technical information on the various characteristics, types and applications of felt and felt products.

BASIC PRINCIPLES OF WICK LUBRICATION

Wick-rise rate or capillarity varies directly with wick density, inversely with oil viscosity.

Wicking distance likewise varies directly with wick density, inversely with oil viscosity.

Oil feed or delivery rate is governed by the absorption capacity of the wick, its capillarity, the cross sectional area of the wick, and the wicking distance.

HENCE: With syphon wicks, the greater the wicking distance, and the greater the cross sectional area, the greater the flow.

With bottom wicks, the shorter the wicking distance, and the greater the cross sectional area, the greater the flow. (Maximum recommended distance about 6 inches.)

With syphon, bottom, and pad wicks, flow can be reduced by mechanically compressing or restricting a section of the wick between the reservoir and point of delivery.

All factors involved in the design of a wick lubrication system have been scientifically studied by the American Felt Company, and are susceptible to accurate mathematical calculation. Felt is an engineering material, and its performance can be determined in advance with as much accuracy as that of any metal or other substance.

ENGINEERING USES OF FELT

Wicks
Oil and Grease
Retainers
Dust Seals
Gaskets
Cushioning and Shock
Absorbing

Filtering Fluids and Gases
Packing
Polishing
Caulking
Insulation
Sound Absorption
Vibration Isolation

Felt is an engineering material of great versatility. It can be made hard as a board, or soft as a kitten's ear, oil-conducting or oil-sealing, fire-proof, water repellent, or fungi resistant, white as snow or any color including black, and it can be cut, punched, turned, ground, pressed and moulded to shape.

American Felt Company

TRADE MARK



Engineering and Research Laboratories:
Glenville, Conn. PLANTS: Glenville, Conn.;
Franklin, Mass.; Newburgh, N. Y.; Detroit,
Mich

SALES OFFICES: New York, Boston, Philadelphia, Atlanta, Rochester, Chicago, Detroit, Cleveland, St. Louis, Dallas, San Francisco, Los Angeles, Portland, Seattle, Montreal

Quality Control At Cadillac

(Continued from page 27)

it a point to check every item from detailed parts to the major assemblies, including frames, bodies and even a complete car. This is done in the large master inspection room which is completely equipped with fundamental tools of the art—surface plates, checking fixtures, gages and instruments. Sheet metal dies, die casting molds, patterns for castings and molds for drop forgings are all verified by checking the

samples. Corrective measures are taken before any of the parts are released.

During the course of production the inspection supervisor receives detailed reports from his staff as to troubles demanding immediate action. Supplementing these are reports from the field, including complaints from customers and dealers. Such reports are deliberately solicited.

Quality control charts have been em-

ployed at Cadillac for many years and have been useful in recording trends and reasons for variations. In addition, careful records are kept of changes due to corrections or engineering improvements in order to make possible the proper correlation with later complaints. This simplifies the problem of finding corrective measures.

To sustain interest in quantity, weekly meetings are held by the works manager with superintendents and supervisors at which time the inspection picture is presented for discussion. Each superintendent, in turn, discusses quality with his supervisory staff at weekly meetings of each group.

Finally it is recognized that no manufacturing operation remains fool-proof. Since trouble can be expected at any point, the supervisory staff of the manufacturing department maintains constant vigilance. The role of the inspection department is to stress prevention rather than cures. Rejections are expensive and constitute a drain on over-all costs.

The inspection department is constantly on the watch for improved methods and instrumentation and does considerable advance planning to take advantage of such developments. With the incidence of electronic inspection devices, such equipment is being studied with a view to its adoption wherever tangible advantages can be demonstrated.

ONE SOLVENT...



NEW SCIENTIFICALLY IMPROVED
BLACOSOLV



FOR
SOLVENT
VAPOR
DEGREASERS

Write today for FREE
BOOKLET ON Degreasers
and application with Blacosolv the all purpose degreasing solvent.

No need to use a special solvent for cleaning a combination of metals—BLACOSOLV degreases them all . . . Safely . . . Quickly . . . Economically.

BLACOSOLV is the most highly stabilized solvent . . . ideal for aluminum, magnesium, brass, copper, steel, etc., either individually or in combination. It is non-inflammable—is positively safe—will not stain or dull even the most highly polished surfaces . . . the one price solvent for all metal degreasing jobs. Its economy is increased in the uninterrupted service it affords you in your production.

G. S. BLAKESLEE & CO.

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.

BLACOSOLV
DEGREASERS AND SOLVENT

NIAGARA
METAL PARTS WASHERS

75S-T Spar Caps

(Continued from page 44)

A study of the alloy, 75S-T, shows that in spite of its disadvantages for bending at room temperature, it is easier to work at elevated temperatures than any other aluminum alloy. At temperatures of from 275F to 300F, it has better forming qualities than either 24S-T or 14S-T have at 400F. Also, there is no material change in the mechanical properties of the alloy in this temperature range. There is a slight tensile strength increase which is dependent upon the time that the metal is held at temperature. A slight decrease in elongation accompanies the stretching required at the bend area.

With these facts in mind, the Ryan Engineering Laboratory decided to heat the spar caps and bend them at a temperature of 300F. To accomplish this, a special set-up was arranged. First, Kirksite metal rocker blocks were installed on the spar cap. They were contoured to the spar section and insulated from it by sheets of Micarta. These rocker blocks rode on greased, hardened

(Turn to page 86, please)

"Save us \$50
worth of
Assembly Time
per unit"
...says
THE GLOBE WERNICKE CO.

Summary of report by James O. Peck Co., independent investigators, of assembly savings made with Phillips Screws . . . another in the series of assembly studies at prominent plants.

• "We manufacture these units for the Iceberg Refrigerated Locker Systems, Inc.," explained the assembly head of The Globe Wernicke Co. "Our engineering department specified Phillips Screws throughout, and we're glad they did."

"Save us \$50 worth of assembly time per unit. We can take full advantage of power drivers with Phillips Screws. No finder is needed and there's no fumbling such as we'd have with slotted screws. Since each unit requires thousands of screws, \$50 is a conservative estimate of how much we save per unit by using Phillips Screws."

"Upside down or sideways . . . Makes no difference. Screws are driven with the unit in one position so that much of the driving is sideways or upside down. Difficult with slotted screws but very easy with Phillips Screws."

"No gouging or burring. Before we settled on Phillips, we tried out a lot of other type screws and found the driver would jump out and gouge the Masonite panels or burr the heads. Phillips Screws ended that, gave us better driving time with our power drivers."

Help yourself to money-saving ideas for your assembly operations. Write for the full report on The Globe Wernicke Co. and other assembly studies . . . covering metal, wood and plastic products. Use the coupon.

PHILLIPS Recessed Head SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

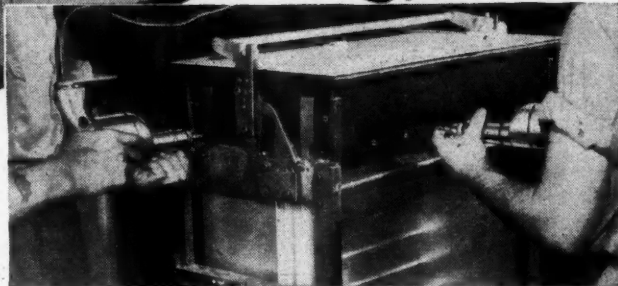
American Screw Co.
Central Screw Co.
Continental Screw Co.
Corbin Screw Div. of
American Hdwe. Corp.
Elec Tool & Screw Corp.
The H. M. Harper Co.
International Screw Co.
Lamson & Sessions Co.
Milford Rivet and Machine Co.
National Lock Co.

24 SOURCES

National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.

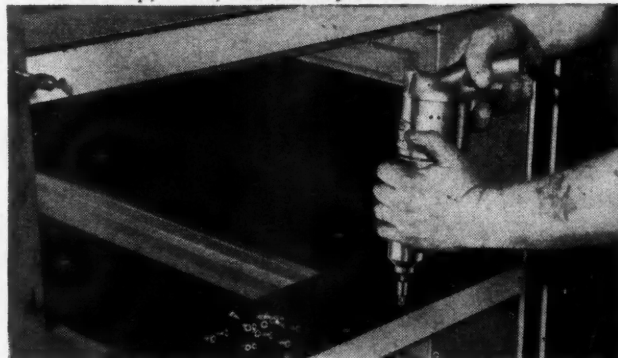
Pheoli Manufacturing Co.
Reading Screw Co.
Russell Burdall & Ward
Bolt & Nut Co.
Seavill Manufacturing Co.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wolverine Bolt Company

THE ICEBERG REFRIGERATED LOCKER COMPANY'S equipment for frozen food storage is made up in combinations of basic units like this 8-section (10 six-cubic-foot drawers to a section) locker.



The complicated assembly of the drawer of the ICEBERG REFRIGERATED LOCKER . . . made without driver skids to injure work or hands, thanks to Phillips Screws.

Most of the thousands of Phillips Screws used in this assembly are Type "A", self-tapping, and are power driven up, down, and sideways.



Report No. 19
ASSEMBLY SAVINGS
WITH PHILLIPS SCREWS
Company
The Globe Wernicke Co.
Cincinnati, Ohio

Phillips Screw Mfrs., c/o Horton-Noyes
1800 Industrial Trust Bldg.,
Providence, R. I.

AA-20

Send me reports on Assembly Savings with Phillips Screws.

Name

Company

Address



SPRINGS?

***Tel. it To B-G-R**

SOLVE your spring requirements the simple way — by putting them squarely up to B-G-R.

PROFIT by long-time experience in springs and intricate metal parts.

SAVE time and trouble by letting B-G-R recommend.

**Tel. it to B-G-R—or tell it by letter or face-to-face. It's satisfaction either way.*

BARNES-GIBSON-RAYMOND
DIVISION OF ASSOCIATED SPRING CORP.

Detroit • Ann Arbor MICHIGAN

**SPRINGS-WIRE FORMS
-SMALL STAMPINGS**

If you have a SPECIAL PROBLEM

in any of these operations, where precision work is demanded and where greater production at man-hour savings is paramount—

• BORING—rough, semi-finish and finish • MILLING (special types) • STRAIGHT LINE DRILLING • UNIVERSAL ADJUSTABLE SPINDLE DRILLING • HONING • TAPPING • REAMING • COUNTERBORING • VERTICAL AND WAY-TYPE EQUIPMENT ...

then a Moline Multiple Spindle Specially Designed machine tool is your answer. Moline tools are ruggedly built and engineered to fit your PARTICULAR requirements, they're made to last for years, they're easy to change over to other jobs, they do better work at less cost and stand up to it longer.

For YOUR special problem, go "HOLE-HOG," write us for any information you may need.



MOLINE TOOL COMPANY
100 20th Street Moline, Illinois

General News

(Continued from page 67)

semi-elliptic springs at the rear. Provision is made for air conditioning, internal heating and radio. The price will be \$1800, including purchase tax, in overseas markets.

Armstrong Siddeley, already out with a post-war model, having a six cylinder engine of 2.56 in. by 3.94 in. bore and stroke, will replace this with a bigger model, more suitable for export.

Vauxhall Motors Ltd., General Motors Corp.'s subsidiary in England, is dropping production of its 10 hp models, and is concentrating on 12 and 14 hp models. Including purchase tax, the price of these models will be \$1750 and \$2220.

Manufacturers generally are satisfied with the introduction of the flat rate system of taxation. There is less satisfaction among existing owners who have to continue paying on a horsepower basis. This means that in very many cases owners of old cars are paying 100 per cent more in taxes than operators of new cars of similar capacity and sometimes of greater value. Mr. Dalton declares that the necessity of raising money made it impossible for him to cut down all cars to the flat rate.

There is much less satisfaction with the decision to increase the purchase tax from 33⅓ to 66⅔ per cent on all cars selling at more than £1,000. It is claimed that orders for expensive cars are being cancelled and that high-class car production will be jeopardized. Makers who are most directly affected are Rolls Royce, Bentley, Daimler, Lagonda, Wolseley, Healey.

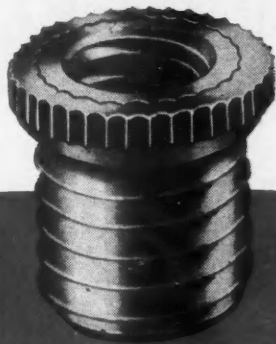
Mexico Restricts Motor Vehicle Import

Reflecting the world wide shortage of dollars, Mexico has indefinitely banned imports of automobiles, trucks and buses, and has sharply increased the import duty rates on motorcycles. This action was taken under Article X of the U.S.-Mexican trade agreement of Dec. 23, 1946. Merchandise on order prior to July 11, 1947 may be imported by Mexico under certain conditions, the Office of International Trade, Dept. of Commerce, said in an official interpretation of the ban. These conditions are as follows:

1—Merchandise shipped prior to July 11 may enter Mexico, paying corresponding duties, upon prior presentation of bill of lading to the National Committee for the Control of Importations.

2—Merchandise shipped after July 11 may be imported only if these

(Turn to page 82, please)



USE THIS THREADED STEEL HOLE FOR TIGHT FASTENING IN SOFT MATERIAL

With the more general use of aluminum and other soft metals in industry, there is a greater need for a tapped hole that will give increased strength to fastener applications under both tension and torque.

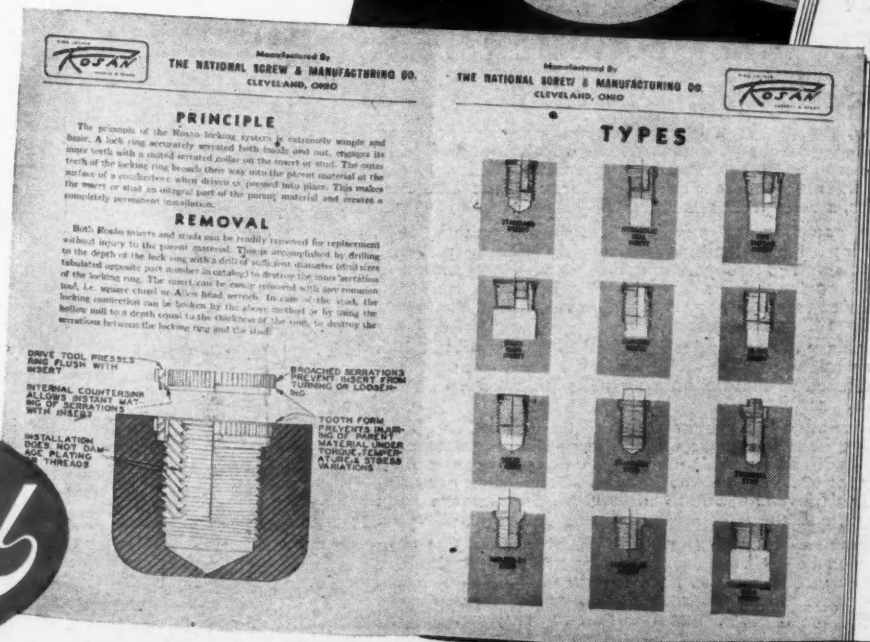
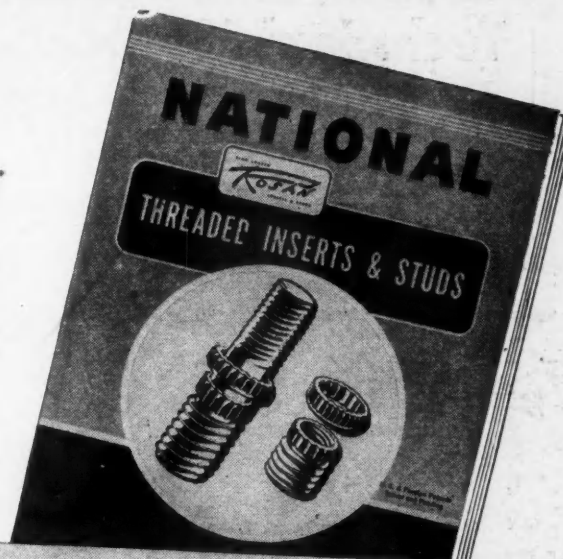
The Rosán Locking System is designed for use in both threaded hole and stud applications to hold fasteners tight in soft material. Its serrated ring locks the insert or stud in position, and prevents loosening or turning, even under vibration. This threaded steel hole can be removed easily by an ordinary drill and any simple wedging tool—and replaced easily—without disturbing the parent material.

Write for this useful catalog of Rosán Threaded Inserts and Studs by *National*.

Other "National" Specialties Include:



Clutch Head Screws
Davis Blind Fasteners
Drake Lock Nuts
Dynamic Lock Nuts
Hi-Shear Rivet Pins and Collars
Huglock Nuts
Laminar Flow Screws
"Lok-Thred" Studs
Marsden Lock Nuts
Phillips Recessed Screws
Place Bolts
Scrivets
Sems



THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

How Strong Is Our Air Force Today?

(Continued from page 45)

reduced in size but has maintained its wartime level of readiness and skills essential to Air Power.

In the research and development field, significant gains have been made over the V-J Day situation and this effort has been expanded broadly. In the interim, the last year in particular, remarkable progress has been made in transonic and supersonic research and whereas the end of the war found sci-

ence on a new threshold, today it stands well up the first series of rungs on the ladder with not only many problems solved but most of the significant trends recognized and analyzed. New data are now in the hands of the AAF and the industry enabling them to project new designs with confidence and even more rapid progress than in the past. New prototypes are already flying, notably the Martin XB-48 six-jet

bomber and the Consolidated Vultee XB-46 four-jet bomber, and the AAF holds the world's speed record and all the other major aviation records on the books.

This brief report, then, echoes (1) an Air Force in being with a high state of readiness, (2) an aircraft industry with production orders adequate for the maintenance of essential skills and technology, and (3) research and development programs showing constantly increasing progress. This, on Air Force Day, 1947.

It is only when we look into the future that the promises are cloudy and the prospects obscure. In the field of Air Power policy and planning no such state of readiness obtains. There is only confusion, mistrust and a bedlam of faulty proposals. The Air Forces cannot prescribe a certain size and composition until our international policy isolates and delineates its probable future responsibilities. The aircraft industry cannot plan until its future tasks are made known. Research cannot be directed into most immediately productive fields until the nature of its application is prescribed. Nor can any of these elements comprising the sum-total of American air power effectively plan for tomorrow until the citizens, through Congress, indicate the measure of their support.

Of pressing importance as the most effective solution to these critical problems is a national air power policy formulated by an authorized group empowered to implement its decision into tangible form. While Air Forces Day—1947 finds the defense of the nation in the air reasonably secure, 1948 may not. And 1949 may find it too weak to merit its name in which case 1950 may find this nation a shambles and the principles for which it stands obliterated from a collectivist world.

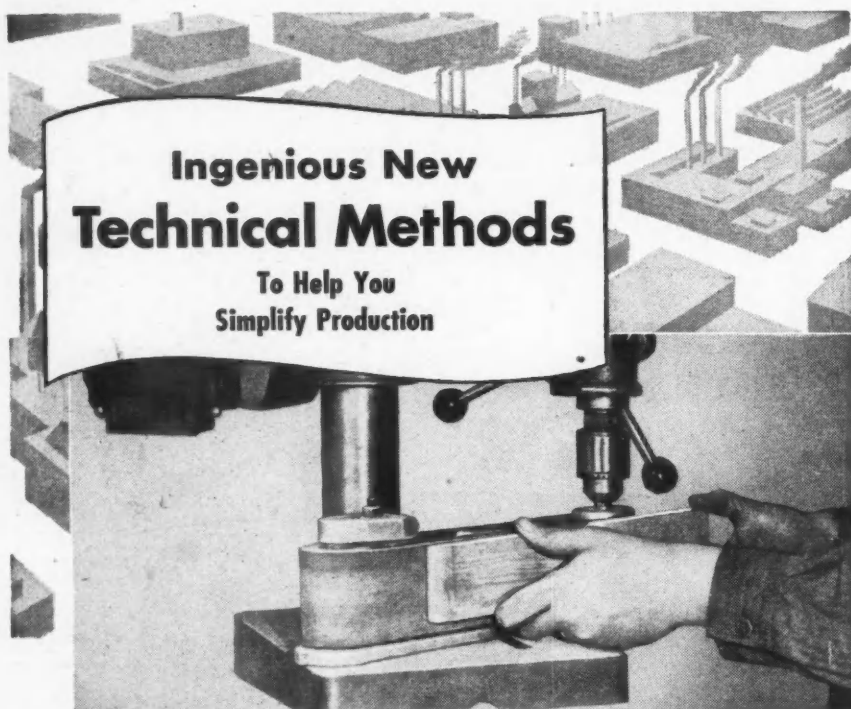
The Congress bears no greater responsibility to the American people than creating the means for their defense. That defense must be in the air and those means must be predicated on a clear statement of policy.

Fruehauf Truck Body

(Continued from page 41)

Directional signals and tail lights are deluxe type and are recessed behind the sturdy rear rub-rail for protection against damage.

Complete assembly sets, as well as replacement units will be stocked by Fruehauf's nation-wide network of factory branches. All units are shipped from the factory prime-coated, and ready for final painting.



NEW BELT SANDER FOR DRILL PRESS Does Finishing Jobs Faster, Better

A new, simple, faster method for many surface finishing jobs on wood, metal, plastic and other materials has been announced by the OK Specialty Company of Chicago. The new finishing method takes the form of the OK Belt Sander, a drill press attachment.

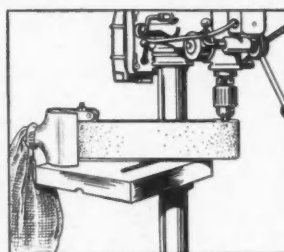
The new sanding device weighs less than 5 pounds. It is made up of an aluminum base with backing plate or platen, a driven pulley mounted on ground steel shaft and running on precision ground ball bearings, and cast aluminum driver pulley mounted on 1/2" ground steel shaft to fit into the drill press chuck.

The base of the sander is bolted to a drill press table. Merely by moving the drill press table, the attachment can be adjusted to handle sanding belts from 26" to 36" in length.

The sander takes belts from 1/2" to 3" in width. Two sanding belts, one coarse grit and one fine grit, are furnished with each attachment. The device comes assembled ready for use with any drill press. Most efficient performance is achieved at 3500 to 5000 RPM. The sander stands 5" high, and the base measures 10 1/2" long by 3 1/4" wide.

Another time-saver on the job is chewing gum. Chewing gum may be used even when hands are busy; and under dust conditions helps to keep the throat moist—prevents "false thirst." For these reasons many plant owners make Wrigley's Spearmint Gum available to everyone.

You can get complete information from
OK Specialty Company, 4655 N. Clark St., Chicago, Ill.

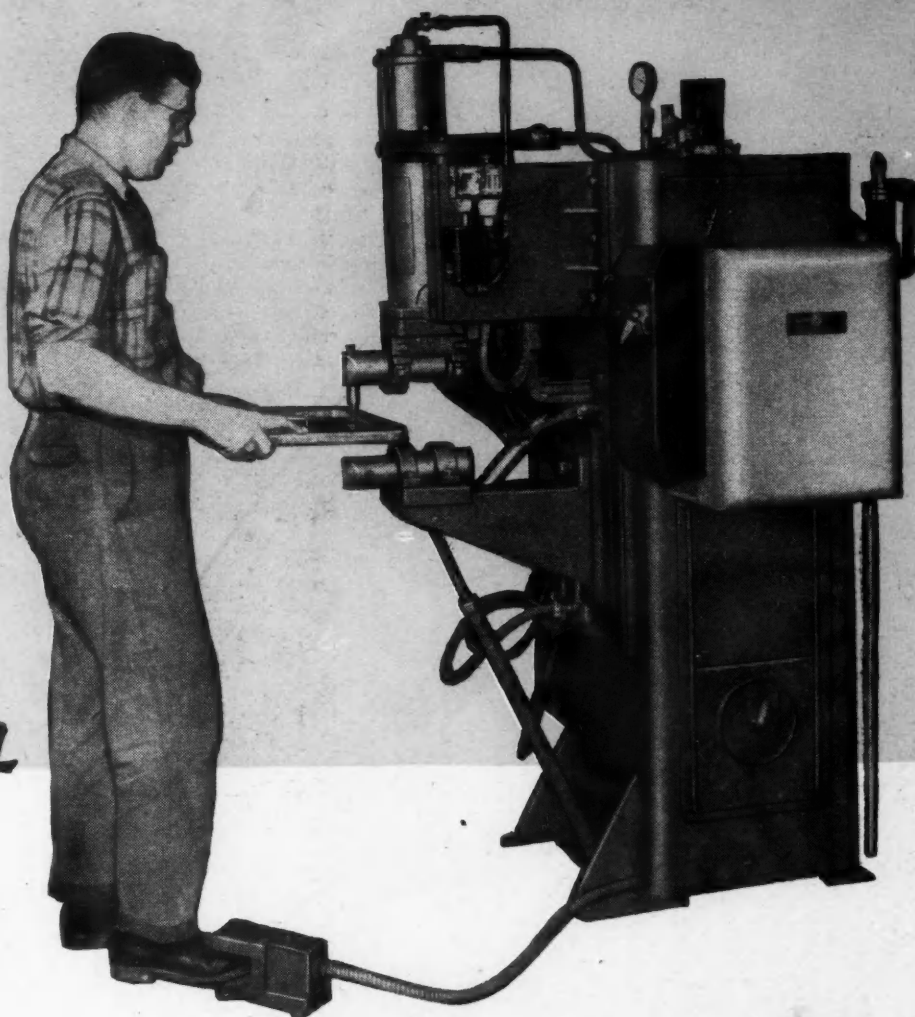


OK Belt Sander
Assembled, Ready for Action



AB-69

This G-E sequence weld timer automatically provides accurate timing of the welding cycle at Bailey Meter Company, Cleveland.



WELDS
4 times
Faster

with G-E ELECTRONIC WELDING CONTROLS

Bailey Meter Company has increased its production rate of certain meter and automatic control parts 400 per cent with a new projection welding machine equipped with a G-E sequence weld timer and ignitron contactor.

With spot welding it took 18½ hours per 100 pieces; now, it takes 4½. G-E welding controls are responsible for a good share of this increase because they provide automatic and accurate timing of the welding cycle.

This timing eliminates the delay and operator error of the manual control on the foot-operated machine formerly used. And, it assures more consistent welding.

NOW, G-E CONTROLS ARE AVAILABLE IN ONE CABINET

General Electric now offers two new, improved lines of welding control—synchronous and non-synchronous. Each has all its components co-ordinated in one, attractive cabinet. Check these outstanding features:

1. Control is factory-assembled, ready-to-install.
2. Easy servicing through large side door of cabinet.
3. Control station always faces operator.

Investigate these and other features in Bulletins GEA-4699 and GEA-4726.

HAVE YOU SEEN "This Is Resistance Welding," G.E.'s full-color movie? It explains what resistance welding is, and where and how it has improved production.

Your nearest G-E office, local utility, or resistance welding machinery manufacturer representative will be glad to arrange a free showing for you.

General Electric Company, Sec. F645-42
Schenectady 5, New York

Please send me the following resistance welding control bulletins:

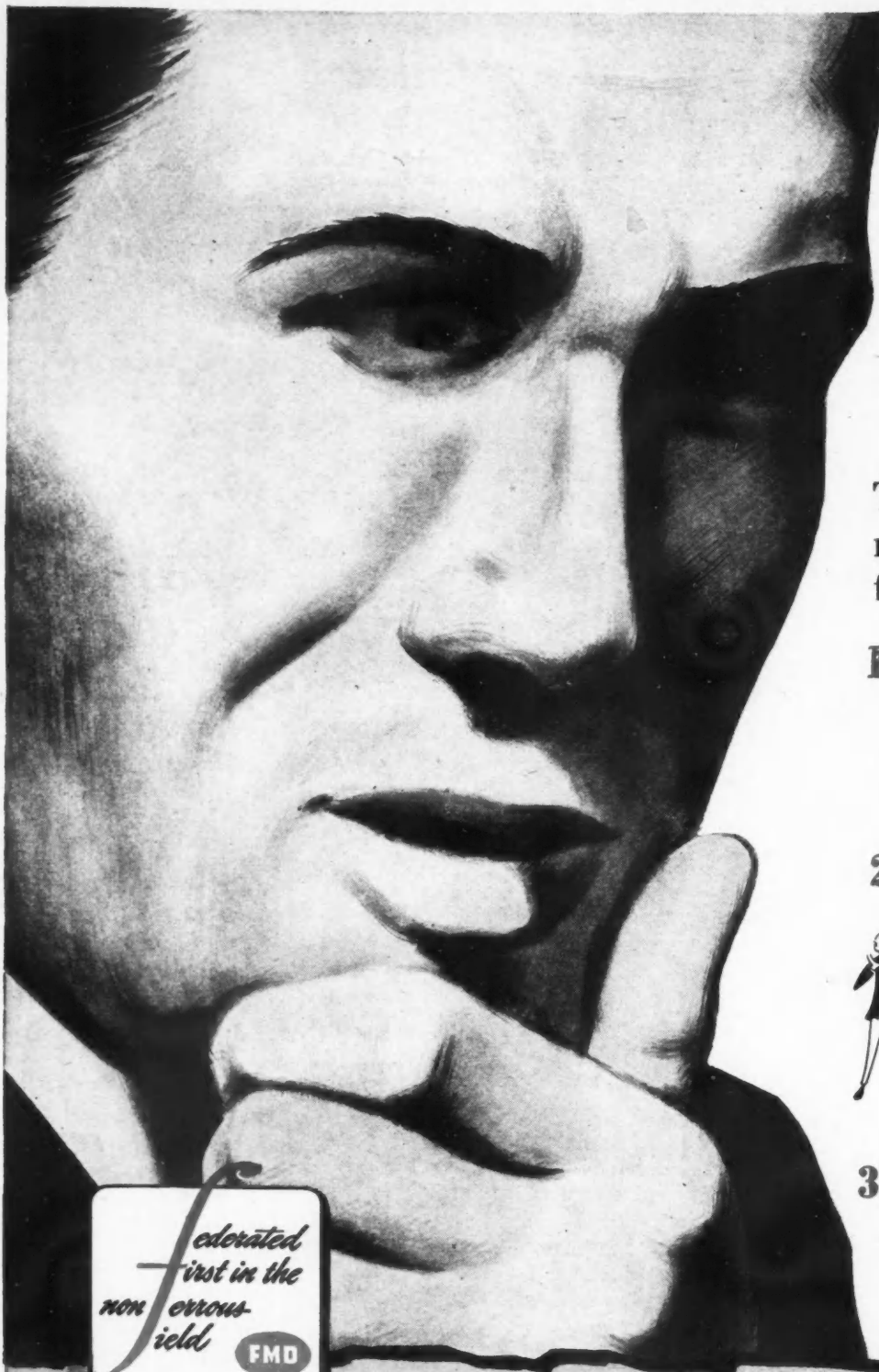
- ☐ GEA-4699 Synchronous Precision Control for Spot and Projection Welding
- ☐ GEA-4726 Non-synchronous Control for Spot and Projection Welding
- ☐ GEA-4571 The Importance of Control
- ☐ GEA-3318B Sequence and Sequence Weld Timers
- ☐ GEA-3158D Ignitron Contactors

Name _____

Company _____

Address _____

GENERAL  ELECTRIC



FORM

*non-ferrous
experts,
that is...*

Try your hand at
melting down these
foundry posers...

1. In running a heat of aluminum the proper time to stir the metal is:

- (a) When it has just melted
- (b) When it is up to temperature
- (c) When transferred to the ladle
- (d) Just before pouring

2.



If .0001% by weight of hydrogen separates from molten copper at 1981° F., the volume of gas formed will be equal to what percentage of the copper volume?

- (a) .01%
- (b) 44%
- (c) .62%
- (d) 13.7%

3. What factor is the key to controlling gas porosity in copper-base castings?

- (a) Hydrogen content
- (b) Furnace temperature
- (c) Oxygen content
- (d) Pouring temperature

*Federated
first in the
non-ferrous
field*

FMD

Federated METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY

Attention foundrymen! Have you any posers of your own you would like to see in print? Federated will pay \$5 to the contributor of each question accepted for subsequent foundry quizzes. Send in your puzzlers right away.

If you want additional copies of this quiz, or useful literature about non-ferrous casting alloys, use the coupon at right.



Non-Ferrous Only!

4. Which of the following aluminum casting alloys has the greatest fluidity and will, therefore, be most satisfactory for detailed castings?

- (a) F480 (4% Cu, 8% Si, no Mg)
- (b) F250 (2% Cu, 5% Si, no Mg)
- (c) F430 (4% Cu, 3% Si, no Mg)
- (d) F410 (4% Cu, 1% Si, no Mg)

HOW'RE YOU DOIN' SO FAR?



5. Which of the following gases is most likely to cause gas absorption when melting non-ferrous alloys?

- (a) Water vapor
- (b) Carbon monoxide
- (c) Carbon dioxide
- (d) Molecular hydrogen

6. If the only specification for a casting is that it must hold 1000 pounds cold water pressure, which of the following alloys can be used?

- (a) Yellow brass (c) G Metal
- (b) 85-5-5 (d) 88-10-2

7. If a manganese bronze test bar of the 70000 T.S./30%E. variety proves to have a high elongation and a low tensile, what is the usual reason?

- (a) Copper too high
- (b) Zinc too high
- (c) Poured too cold
- (d) Poured too hot.

8. What is the most probable source of gas porosity in castings?

- (a) High pouring temperature
- (b) Improper gating
- (c) Improper melting practice
- (d) Wet sand

9. When casting copper, the presence in the melt of .02% phosphorus will result in a conductivity of:

- (a) 99% (c) 95%
- (b) 98% (d) 90%



10. Which of the following alloys shows highest solidification shrinkage, that is, the particular contraction which occurs when metal changes from liquid to solid?

- (a) Aluminum bronze (b) Copper
- (c) 80-10-10 (d) Manganese bronze

"DOC TILLITY" says:



HERE ARE THE ANSWERS

1. Avoid stirring altogether; it will create pores that remain in the metal and produce dirty castings. • 2. (b) 44%. • 3. (c) Oxygen content. • 4. (a) F480, because it contains the most silicon, the element which improves fluidity. Notice how the Federated specification number permits easy identification of the alloy's composition. • 5. (a) Water vapor, because it breaks down into atomic hydrogen, which is very soluble. • 6. Any one, providing a properly designed and sound casting is made. • 7. (a) Copper too high. • 8. (c) Improper melting practice. • 9. (d) 90%. • 10. (c) 80-10-10.

HOW TO RATE YOUR SCORE

How'd you make out? If you rang the bell for 8 or more out of 10 you deserve a bigger pay check. With 6 or 7 correct you should be in line for at least a month's vacation in Florida this winter.

Anything less than 6 right puts you in the "somop'n ought be done" class. Try reading some of Federated's helpful literature. And if your non-ferrous problems are really tough, a friendly Federated serviceman will be glad to help you. Call or write any of Federated's 11 plants or 25 sales offices from coast to coast or Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, New York.

FEDERATED METALS DIVISION, Dept. AA
American Smelting and Refining Company
120 Broadway, New York 5, New York

Please send me the items I have checked:

- ☐ Non-Ferrous Metals and Alloys booklet
- ☐ Aluminum Casting Alloys booklet
- ☐ Test bars booklet
- ☐ Reprints of technical articles
- ☐ Reprints of this quiz

Your Name _____

Company Name _____

Address _____

City _____ Zone _____ State _____

General News

(Continued from page 76)

conditions are fulfilled: that contracts exist entered into prior to May 18, 1947; that the contract be bona fide; that delivery of the merchandise included in the contract had been fixed for any date before Oct. 15, 1947; that payment had been made, or an advance on account of same, or the form of payment for the merchandise had been fixed, or, that the entry or the merchandise is necessary in order to avoid serious

injury to the importer or to the foreign exporter.

The new import duty rate for motorcycles is 100 pesos each for motorcycles and 120 pesos each for sidecars, as compared with previous rates of 40 pesos and 65 pesos, respectively. One peso currently equals \$0.2062. OIT pointed out that if the National Committee, at a later date, establishes import quotas in place of the absolute prohibitions, imports effected during the transitory period shall be deducted from the total quota which may be determined. This provision is made in Article VI of the trade agreement. Restrictions

of this nature are of a transitory character, OIT said, and may be modified "as the equilibrium of the Mexican balance of payments may be achieved."

Tool Congress Meetings to Be Held With NMTBA Tool Show

The Machine Tool Congress' official program to be held in conjunction with the NMTBA Machine Tool Show in Chicago is listed below:

American Machine Tool Distributors' Association; dinner meeting on Sept. 17; principal speaker, Fulton Lewis, Jr.

American Soc. of Mechanical Engineers, joint session Production Engineering and Machine Design Div.; dinner meeting on Sept. 18; speakers: J. I. Wilson, Thompson Grinder Co., and J. F. Lincoln, president, Lincoln Electric Co.

Joint session of American Soc. of Tool Engineers and the American Foundrymen's Association; dinner meeting on Sept. 19; speakers: Myron S. Curtis, Asst. Director of Engineering, Warner & Swasey Co., and T. E. Eagan, Chief Metallurgist, Cooper-Bessemer Corp.

National Electrical Manufacturers Association; dinner meeting on Sept. 22; principal speaker, C. S. Kettering, Research Consultant, General Motors Corp.

Chicago Technical Societies Council; dinner meeting on Sept. 23; principal speaker, George Habicht, Jr., president Marshall & Huschart Machinery Co. and president, American Machine Tool Distributors' Association.

American Soc. of Mechanical Engineers; dinner meeting on Sept. 24; speakers: Michael Field, Cincinnati Milling Machine Co. and J. R. Longwell and Fred W. Lucht, Carboly Company, Inc.

Soc. of Automotive Engineers; meeting on Sept. 25; speakers: C. E. Frudden, consulting engineer, Allis-Chalmers Mfg. Co., and president, SAE, and Joseph Geschelin, Detroit Editor, AUTOMOTIVE INDUSTRIES.

Legislation In '48 For Synthetic Rubber Industry

The nation's war-built synthetic rubber industry will continue to stagger along under interim legislation until the 80th Congress convenes its next session in January 1948. Legislation will be written at that time, it is expected, calling for the compulsory consumption of a minimum amount of synthetic rubber in order to assure continued operation of the plants. Determination as to what products will contain synthetic will probably be left to the industry.

The plants are still being run by RFC and existing controls on rubber (Turn to page 84, please)

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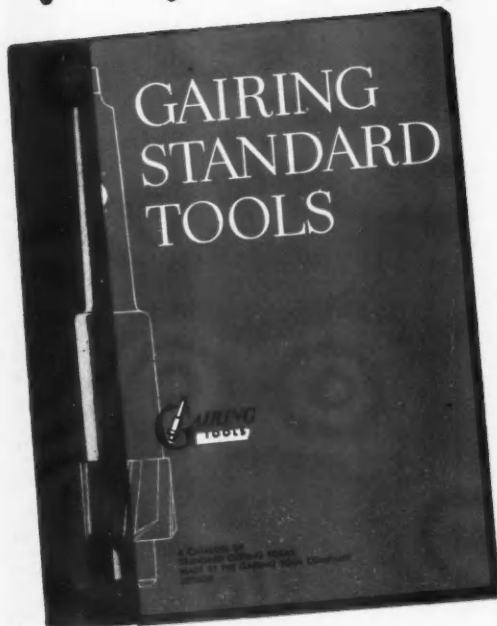
Gairing Standard **THREADED HOLDER**
showing Adjustable Stop Nut

Gairing Standard **CORE DRILL**
with Interchangeable Cutter

Gairing Standard type **C COUNTERBORE**
with Interchangeable Cutter and Pilot

Gairing Standard Block-Type **BORING BAR**
showing "quick-change" Cutter Block

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Send now for this handy booklet
showing the complete line of
Gairing standard tools.

These and many more, the whole line of standard cutting tools made by GAIRING, are now completely described and shown in the new *Gairing Standard Tool Catalog*.

All these are tools of general application, made in standard designs and generally available from stock. All are based on the economy principle of interchangeable cutters and some of them have been made by us for as long as thirty years.

Completely catalogued are: interchangeable counterbores, threaded holders, full floating holders, tungsten carbide tipped counterbores, back spotfacers, core drills, micro-nuts and hollow mills. A few pages are devoted to an introduction of the block-type boring tools and some of the more generally used special tools like multi-diameter cutters, carbide-tipped cutters and milling cutters.

THE GAIRING TOOL COMPANY

**21221 HOOVER ROAD
DETROIT, MICHIGAN**

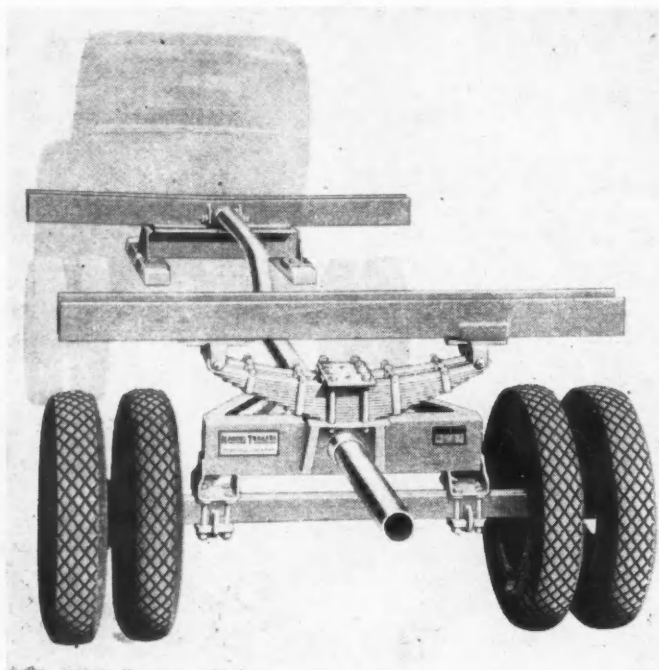


General News

(Continued from page 82)

expire on March 31, 1948. Prior to that time the House Armed Service Subcommittee on Organization and Mobilization believes that Congress will have enacted into law a far-reaching rubber program that will permit rubber manufacturers and natural rubber producers to plan their future with a reasonable degree of certainty. Another problem to be taken up in the legislation is that re-

lating to plant disposals and the effect of such disposals on concentration within the industry. Current expectations, therefore, are that the subcommittee will conduct hearings this fall; will anticipate receiving suggested legislation from the industry along with any additional recommendations from government; will observe the industry in its actual operation; and will present a bill to Congress in January 1948 that should be acceptable to industry from the standpoint of operation and to the government whose vital interest lies in the realm of national security.



NABORS Logging Trailer Equipped with TUTHILL Springs

WHERE the going's tough, terrain rough and only the best can stand the gaff of such severe usage, trailer jobs like this are fitted with TUTHILL Springs. Unit shown is a Pole or Logging Trailer built by W. C. Nabors Co., Mansfield, La. TUTHILL Alloy Steel Springs are used for dependable service, load-carrying capacity and low cost.

Tuthill makes a complete line of leaf springs, standard or special. What are your requirements?



**TUTHILL
SPRING CO.**
760 W. Polk St.,
CHICAGO 7, ILL.

Quality Leaf Springs for Sixty-seven Years

Drive-In Fly-In Big St. Louis Shopping Center

Some idea of the shape of things to come in community planning is seen in the Hampton Village shopping center, St. Louis, Mo. Covering 500,000 sq ft of floor space, the \$11 million Village has, in addition, parking facilities for 2500 cars at one time as well as reserved helicopter parking areas. This development is in the heart of southwest St. Louis, easily accessible to 600,000 surrounding residents.

Industry Awaits Test Of Taft-Hartley Labor Law

Industrial relations directors in the automotive industries so far have been very guarded in the comments on the new Taft-Hartley labor bill. The general opinion seems to be that it still is too early to tell how the various provisions of the act will affect labor relations in the automotive industries and that a number of test cases will have to be tried in the courts before a determination will be possible. Actually, most observers believe that with most contracts already signed in the automotive industries and running for at least a year, there will be very little reason to exercise new privileges under the law until sometime in 1948.

Ford Motor Co. is the only major automobile manufacturer to have the union shop and that will be undoubtedly continued legally in the new Ford contract, which certainly will be completed before Aug. 22 and can run for a year from that date. What will happen so far as dues check off is concerned is not known but undoubtedly the union could provide its members with printed letters of authorization which they would sign and return to the company.

Effect of the Present Method Of Taxing Corporate Earnings

A corporation is taxed 38% of its income, and the dividends received by the individual stockholder are taxed in full at the individual rates. It is necessary for a corporation (with \$50,000 or more net income) to earn \$1.61 before Federal taxes in order to pay a stockholder a \$1 dividend.

TOTAL TAX ON \$100 OF CORPORATE EARNINGS			
Stockholder's Taxable Net Income	Stockholder's Tax on \$62 Dividend	Total Tax on \$100 Corporate Earnings	Amount Retained by Stockholder Out of \$100 Corporate Earnings
\$ 5,000	\$15.31	\$53.31	\$46.69
10,000	20.03	58.03	41.97
15,000	27.68	65.68	34.32
25,000	34.75	72.75	27.25
50,000	42.41	80.41	19.59
75,000	47.71	85.71	14.29
100,000	51.24	89.24	10.76

From annual report of Minnesota Mining & Mfg. Co.

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4.32
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9.59
4.29
0.76

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TRIEE



**TURN OUT
HIGH QUALITY
BIG CASTINGS
FASTER, EASIER**

**...WITH
WICKES NO. 4
DIE CASTING
MACHINE**

WICKES... manufacturers of heavy duty engine lathes and other specialized machinery for 97 years—now brings you the *fastest-producing, easiest-operating* die casting machine of its size. It's the new Wickes No. 4 Die Casting Machine for lead, tin, and zinc alloys. It's fast!—dies open and close at the rate of 750" per minute, with a momentary slowdown just before closing. Up to 600 shots per hour—up to 25 lbs. zinc each—are injected at pressures of 1,500 to 6,000 P.S.I. A lightning-fast accumulator injects the molten metal into the die cavity, eliminating auxiliary air compressors and nitrogen flasks. The Wickes No. 4 Die Casting Machine *reduces set-up time to a minimum*, because the distance between bolster plate and platen is easily adjusted from 9 to 23 inches with just one lever. Now dies can be installed in record time—*no time-wasting adjustment of tie bars*. Dual metal pots, alloy steel tie bars, shockless die clamping pressure applied through toggle mechanism.

Our engineers will be glad to show you how the Wickes No. 4 Die Casting Machine will increase your profits by enabling you to produce a wide variety of high quality castings at high speed and lower cost in your plant. *Write today for complete particulars.*

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August 1, 1947

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737 Sherman Street Chicago 5, Ill.

Booth
TRADE MARK

**PRECISION CUT
FELT PARTS**

75S-T Spar Caps

(Continued from page 74)

steel plates so that they could slide outward under pressure of bending. Then, the spar cap was placed in a hydraulic press and a steel punch was attached to the upper head of the press. This tool was also contoured to the spar cap and insulated from it.

For heating the spar cap prior to bending, an ignitron contractor panel, phase shift control and transformer were used. Primary plant current of 440-v, 60 cycle alternating current was fed to the ignitron, the igniters of which were controlled by a heat control. Here, the current was altered in conformity with the heat control's setting which automatically determined the percentage of current required. The transformer took the 400-v current and converted it to 15,000 amp at 9 v. The ignitron, transformer and conductors were water-cooled conductors to the section of the spar cap to be bent. The spar cap was slightly roughened with 50 grit paper where the conductor clamps made contact. Spacing of the clamps was carefully determined by estimating the amount of metal desired between the contacts in order to produce the proper heating effect.

When the switch was contacted, a flow of current between the spar cap clamps quickly heated the metal to 300F. At this point, the hydraulic press was started and the punch lowered with a pressure running up to 75,000 lb. The correct amount of bending was indicated by gauges attached to the spar cap extremities. After bending the spar caps for sweepback, they were removed from the press and turned to bend them for the necessary dihedral.

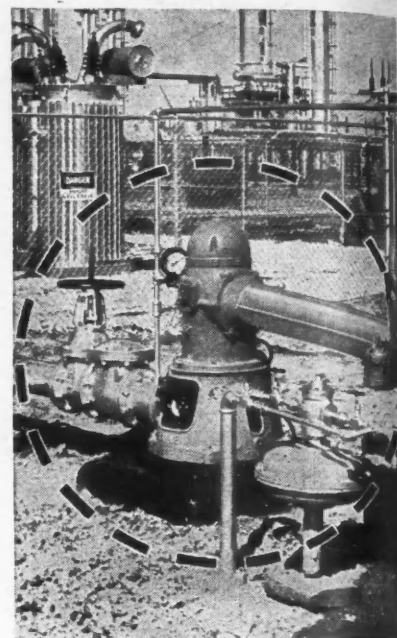
Due to the great amount of compression strain occurring during the forming operations, it was necessary to cut notches in the compression legs of some of the spar caps to prevent extreme distortion. These notches were generously rounded and polished and no danger of premature fatigue failure resulted from their use.

Computing Valve Area

(Continued from page 68)

in. Here it will be noted that with a narrow seat the gain in area with a 30 degree angle is much greater; that is, 19.6 per cent. The table also shows that the flat seat valves have little advantage over the valves with a 30 degree seat at maximum lift, but a marked advantage during the first part of the lift.

The foregoing discussion is not intended to imply that there is a direct relationship between the valve area and the amount of gas that can be passed through different valves under a given head, such as atmospheric pressure.



We Are Proud OF THIS PICTURE

To you, the reader, the above picture is just one of hundreds of Layne Well Water Systems that are now serving oil fields, refineries and pumping stations. But to us, it is a symbol of approval by one of the world's largest and most important industries. Furthermore, this picture serves to symbolize a record of nearly seventy years of successfully matching the highest quality materials with honest craftsmanship.

Yes, we are proud of this picture—and several thousand others of Layne Well Water Systems now serving Municipalities, Railroads, Factories, Chemical Works, Packing Plants, Paper Mills and Air Conditioning and Irrigation projects.

We know the penalty of leadership in our chosen field, the flattery of imitation and the real satisfaction of serving the same customers for generations and generations. Our equipment and services are consistently higher in quality than the buyer demands—more dependable than we promise—and longer lasting than the owner expects.

If such points of merit are of more interest to you than a "special price", we can serve you with complete satisfaction. For late bulletins, catalogs, etc. address

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